THE Airman

MAY 1961

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AIR FORCE RESEARCH AND DEVELOPMENT

Hon. Joseph V. Charyk, Under Secretary of the Air Force.

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PARTNERSHIP

"The directive (DOD 5160.34) assigns to the Department of the Air Force responsibility for research, development and operation of all Department of Defense reconnaissance satellite systems. The Air Force also is assigned responsibility for research and development of all instrumentation and equipment for processing reconnaissance data received from these satellite systems.

"The Air Force will provide, launch and recover the payloads, delivering the collected raw data to the Army. The Army will be responsible for the operation of all systems for processing and reduction of this data. The Air Force will be responsible for research and development of all geodetic satellite systems, exclusive of data processing and data reduction which will be the responsibility of the Army."

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THE Airman

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THE AIRMAN is primarily a medium for the exchange of ideas and information among Air Force personnel. Readers are encouraged to submit articles, short subjects, photographs, and artwork. All contributions will be given consideration; suggestions and criticisms are welcomed. Opinions expressed by individual contributors do not necessarily reflect the official viewpoint of the Department of the Air Force. All photographs are official USAF photos unless otherwise designated.

LETTERS TO THE EDITOR

Omission

Sir: We read with much interest your article in the March issue of THE AIRMAN, *A New Command for an Expanding Job.* Unfortunately, a significant omission was made. In the organizational chart at the top of the page and in those sections of the article dealing with command and control systems, there was no reference to AMC's Electronic Systems Center. This organization, commanded by Maj. Gen. Clyde H. Mitchell, is a parallel unit to ARDC's Command and Control Development Division. ESC bears the responsibility for the traditional AMC functions of procurement, production and installation in regard to Command and Control System, while CCDD bears the R & D responsibilities. ESC and CCDD are abetted by units from several operator-user commands and the Air Training Command. Collectively, the units form what we call the Hanscom Complex, a title based on our location at Hanscom Field, Bedford, Mass. Producing major electronic or weapon systems is not a one-command job; it is very much a team effort.

Maj. Philip S. Cox
Laurence G. Hanscom Field, Mass.

★ ★ ★

Fighter Pilot Fights Back

Sir: Your evocative story by Lieutenant Bach (*Alas, Poor Fighter Pilot,* February 1961) about the generations of "old heads" is sure to rub quite a few "survivors" the wrong way.

He puts that anonymous tiger of the Yalu and the fighter aircraft he flew in the same category as the cavalryman and his horse—one that was romantic and dashing, but also presently quite dead. We "graybeards" would like to be regarded as live brothers of the lieutenant, not uncles.

Let's face a few facts. Maybe the day of the fighter-vs.-fighter mission is gone for the American flier, but the day of the fighter pilot is most emphatically not. They may have made hyphenated specialists of us (fighter-interceptor, fighter-bomber, etc.), but it makes no-never-mind what this fighter pilot is shooting at. Fighter pilot is a state of mind, an attitude. You can be

(Continued on page 44)

★ ★ ★

FRONT COVER: **X-15 over Thunderhead.** Illustration by Ralph Iligan, member of the Society of Illustrators.

AIR FORCE RESEARCH AND DEVELOPMENT PROGRAM

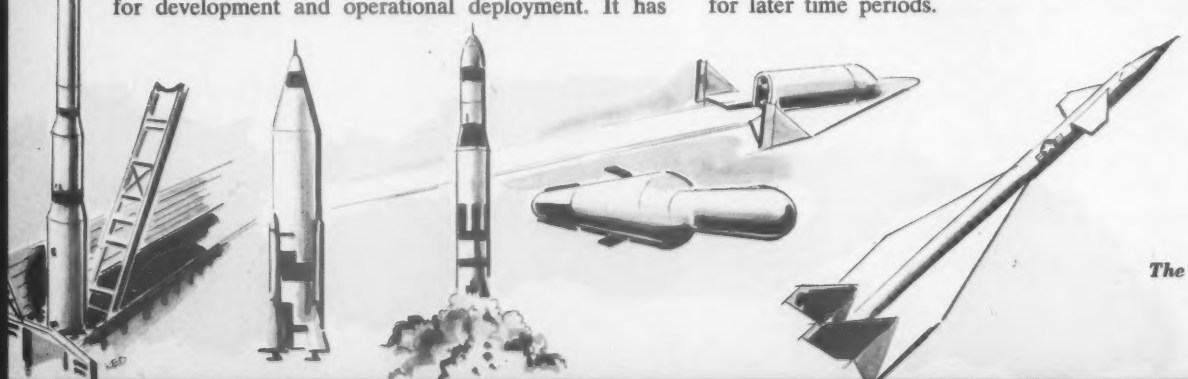
Statement of Honorable Joseph V. Charyk, Under Secretary of the Air Force, before the House Committee on Science and Astronautics, Washington, D. C.

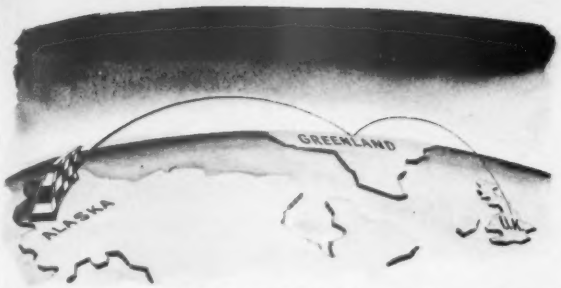
The continued goal of providing a logical research and development program consistent with our national policy has been strongly emphasized in its formulation and implementation. It is my opinion that the highlights which I will present strongly support this premise. In presenting these results we have organized them for presentation purposes into operational developments, advanced developments, research programs, and command operations.

Operational Developments

Strategic Systems: In the strategic systems area the primary objective has been to assure a proper mix between manned and unmanned systems so as to provide for a strong flexible deterrent posture in the future. The development of the *Atlas* and *Titan I* has progressed to a point of production and operational deployment. The problems relating to these two aspects have not been completely ones of development, but have dealt with the transition to an operational role. A significant highlight of this program was the attainment by the *Atlas D* of a 7,200-statute-mile range on the 9th of August and 22nd of October 1960 and a 9,000-statute-mile range on the 20th of May and 19th of September 1960. These four shots demonstrated the performance flexibility possible with these missiles. The *Atlas* also has been adopted as a first stage booster in most of the current space systems under development. The *Titan I* has also shown considerable progress this past year, resulting in 13 successful and 3 partially successful shots out of 20.

Substantial progress has been made in what we consider our second generation ICBMs. *Titan II,* with storable propellants, permitting faster reaction time, simplicity and improved hardening, has been approved for development and operational deployment. It has also been adopted for use as the first-stage booster for *Dynasoar I.* In the development of a solid propelled ICBM, our initial shot was considered an outstanding accomplishment in attaining complete success in the first test firing of the three-stage 60-foot, 65,000-pound solid propellant *Minuteman.* This first launch on 1 February attained a range of 4,200 statute miles approximately one year ahead of the originally estimated date. The manned strategic force of the future is linked to the development of the B-70 bomber. This system is being developed to provide intercontinental range at Mach 3 and high altitude with the capability of delivering a multiple load of high yield weapons. Some of the advantages provided will include target and weapon selectivity, recallability, damage assessment and recoverability. Appropriate subsystem contracts have been initiated to phase in with the requirements of the development program. To increase the offensive capability of the B-52, which will be the backbone for our manned strategic forces for some time to come, the *Skybolt* air-launched ballistic missile program was undertaken in 1959. This missile is progressing through its hardware stages and should be available for initial testing late this year. This system will enhance the useful life and capability of the B-52 for later time periods.





Air Defense: Major emphasis during the past year has been placed on the attainment of systems to provide warning against any enemy attack. The most difficult is the detection and identification of ICBM attacks. In the past year our initial BMEWS station in Thule, Greenland, has become operational and is now providing information to our continental command posts. Expedited efforts have been exerted to accelerate the attainment of an Integrated Operations Center (IOC) at the Alaskan site by mid-year and at the UK site in early 1963. Developments have also been undertaken in the use of infrared detection techniques on orbiting vehicles to provide detection of ballistic missiles during the boost phase.

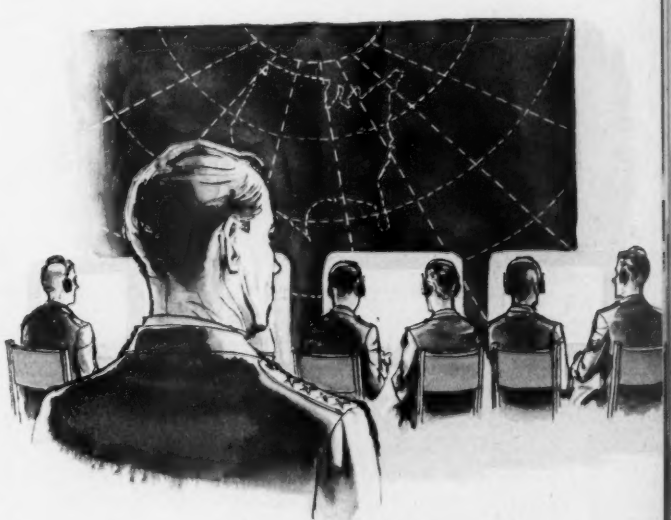
Tactical Systems: Extensive studies have been completed which have provided necessary information and background to develop an operational requirement for a tactical fighter aircraft. The specific operational requirement for this tactical fighter has been established and is now in the process of being approved for source selection and subsequent development. Navy participation in the final review of the requirement has been solicited to insure that future naval applications for this type of system could be effected with minimal modification. This system is being developed to insure air superiority and air support in limited war situations. Its performance covers a wide spectrum of operating conditions, including a short takeoff and landing capability and maximum flexibility for this very difficult mission.

In addition to the development of a tactical fighter for the limited war role, improved airlift capability has also been emphasized. Efforts have been initiated, not only to modernize our transport fleet by purchase of existing modern jet aircraft, but a requirement has also been developed and approved to provide the basis for the design and development of an advanced transport aircraft. Source selection is anticipated in early March. A tri-service effort was also initiated during this past year on a VTOL assault transport. The Department of Navy was selected as the systems development manager.

Command and Control and Support Systems: Revolutionary advances in the destructive power of weapons and the speed and range of delivery systems have created a difficult problem in command. The extreme quantity and abstract quality of data, the compression of decision time, and the necessity for rigid central control to avoid accidents have imposed a severe problem upon the top commands. A vigorous approach to the development of modern command and control systems has been required. This general area of development was undertaken several years ago and has grown in complexity, scope, and difficulty. The Air Force, recognizing this critical situation during the past year, initiated several studies, both by military operational groups, as well as the scientific, technical community to re-evaluate these problems in an attempt to focus our methods of approach and to seek better solutions. The Becker Committee and the Winter Study both provided considerable insight into these development areas. The Air Research and Development Command (recently redesignated USAF Systems Command) has placed increased emphasis on the importance of command and control as an extremely important development area and is continuing to study and implement other recommendations for an effective approach to this difficult development field. A listing of some of these important systems under development and a brief statement as to its status is given as follows:

425L—We have continued the development program for our North American Defense Combat Operations Center. As you probably know, this will be an integrated combat operations center from which the Commander in Chief, NORAD, can direct and control aerospace defense of the North American Continent.

438L—The Intelligence Data Handling System, required by SAC, North American Air Defense Combat Operations Center, Air Technical Intelligence Center, and the Air Force Intelligence Center is an integrated



system for processing and delivering intelligence information by electronic techniques. We have continued our development of the system during this past year.

465L—We initiated development and test of prototype equipment for the Strategic Air Command Control System at the contractor's facility.

480L—We have continued to modernize, expand, and augment with new techniques the present Air Force Communications System. This program is being accomplished on an evolutionary basis and is necessitated by the introduction into the Air Force of the various command and control systems and the voluminous data required by each; the compression of the reaction time as a result of ballistic missiles and the well publicized phenomena called nuclear black out.

496L—In October 1960 the DOD transferred responsibility for development and operation of Space Track to the Department of the Air Force. This system is being developed to detect, track, and catalog all earth satellites and space vehicles in orbit. During the past year an interim National Space Surveillance Control Center became operational at L. G. Hanscom Field, Mass. Operational control for this system will be assumed by the Commander in Chief, North American Air Defense.

Operational Support: The Operational Support Program includes miscellaneous equipment not identified with any specific system or mission. These are not weapon systems but are necessary for the support of various combat systems and have general application. A few examples of developments in this area are:

An ultraviolet altimeter for use on vehicles operating at altitudes up to 125,000 feet;

A carbon cloud decoy to confuse infrared guidance systems;

And, an ophthalmic filter to control the transmission of light energy to provide protection for pilots' eyes while permitting optimum cockpit visibility under the wide range of operational conditions that may be encountered with future systems.

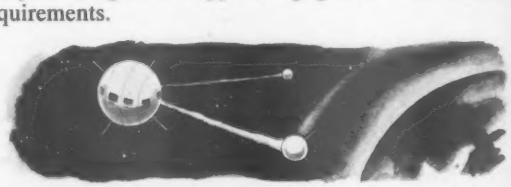
Advanced Development

The advanced development area is the foundation of Air Force systems of the future. It is in this phase that we translate the results of applied and basic research efforts into integrated hardware, resulting in actual tests and demonstrations of the application of advanced technology for military purposes. These developments are not only critical building blocks in our development, but also result in the greatest expenditure of resources short of full weapon system development.

Discoverer: The purpose of the *Discoverer* program is to design, develop and flight-test satellite vehicles. I believe that the Committee members are most familiar with the significant accomplishments of the *Discoverer* program during this year. During 1960, 11

Discoverers were launched, seven orbited successfully and in four cases, the capsule was recovered. In three of these instances, it was air-snatched. The more powerful and guided *Discoverer* vehicles will fly equipment designed to collect background infrared information, continue testing of *Agena* components for other satellite programs, collect selected geophysical and biomedical data, and will further perfect the technique of reliable recovery of capsules of space vehicles.

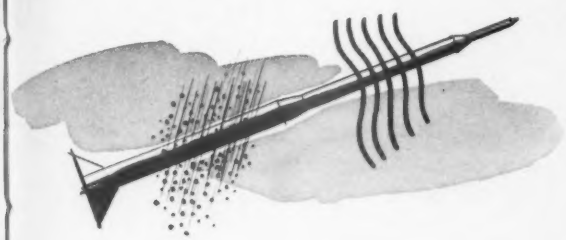
Dynasoar: The *Dynasoar* may be regarded as a logical follow-on to the X-15 in the exploration of aerospace. This military test system has a capability for manned, maneuverable, hypersonic re-entry from orbital altitudes and velocities with a normal landing at conventional air fields. It consists of a minimum sized delta-winged glider which is boosted to near orbital speeds by a modified *Titan II*. From program approval in May, we have placed primary emphasis on trade-off studies, prosecution of development studies leading to a design configuration freeze early in 1961 and an analysis of ground-support equipment and facilities requirements.



Saint: In the past year it has become more evident that a requirement exists for being able to inspect satellite vehicles in space. We must be able to determine the characteristics and intent of any satellite launched. *Saint* is designed to meet this requirement. The first contract for this program was let in late 1960.

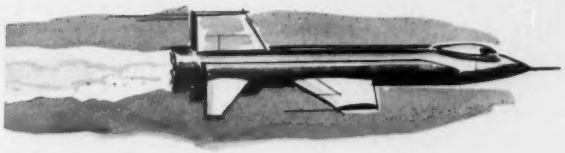
Aircraft Nuclear Propulsion: As you know, the Direct and Indirect Cycle Engines have been under concurrent development in the ANP program for some time. Considerable progress has been made on both cycles during the last year. Ceramic fuel elements and

associated coatings are being developed and tested in a full-scale Direct Cycle reactor to insure a useful life and low fission product leakage. Progress on the Indirect Cycle has involved work on liquid metal pumps, oxidation resistant coatings and radiator developments. These all require further development and test to assure desired integrity. Technical assessments of these parallel approaches are made on a continuing basis.



HETS: The characteristics of an aerospace system are defined by its environments. As man with his machines enter a broader spectrum of performance, they encounter an entire new realm of environmental circumstances. Such considerations are cosmic radiation, meteoritic impact, high levels of acoustic energy, and the hazards of closed ecological systems have become paramount. The Air Force in close coordination with the NASA is developing an advanced version of the NASA *Scout* as a vehicle to lift experiments weighing from 25 to 1,000 lbs. into this new environment. Testing subsystems in this manner should provide, at relatively moderate costs, needed design information for final military system configuration. The *H*yper *E*nvironmental *T*est *S*ystem, *Blue Scout,* will be completed in 1961. Of the two launches attempted through CY '60, one was successful.

Recoverable Boosters: The cost of placing payloads in orbit is extremely high. We have been conducting studies to determine what means might be available to recover at least the first stage booster. We have considered such techniques as lifting surfaces, air-snatch, rotating blades, etc. Next year, we plan to exert continued efforts in this direction so that we may obtain adequate results to form a basis of significant cost reduction in the future.



While I am in the Advanced Development area, I would like to briefly cover Air Force support to other agencies. First of these is the NASA supported *Able-4/Thor* test vehicle. This was launched in March 1960 carrying *Pioneer V* satellite. *Pioneer V* was designed for conducting scientific experiments related to magnetic field and radiation phenomena in deep outer space, and to pass as close to the sun as possible. Communications were lost with *Pioneer V* when it was 22.5 million miles from the earth.

During 1960, there were five booster vehicles launched for ARPA's *Transit/Courier* program. Three of the five vehicles were successfully orbited. We are also supporting NASA's *Mercury* program and the Army's *Advent* program.

The joint Air Force-Navy-NASA program using the X-15 flying laboratory will be continued next year. The NASA-Air Force team established a new world's altitude record of 136,000 feet and attained a speed of 2,196 m.p.h. using the XLR-11 engine.* This program was marred by an explosion while ground testing the XLR-99, 50,000 lb. variable-thrust rocket engine. The number three aircraft suffered substantial but repairable damage. The number two aircraft now has installed the XLR-99 engine. Three flights have been accomplished limited to Mach 2.9 and 75,000 feet. This aircraft has a performance capability of Mach 6.5 and 250,000 feet altitude.

Development Support: For some years now the Air Force has found it necessary to employ a group of contractors to assist it in the areas of technical direction and systems integration, advanced planning, analysis, space developments, and command and control. These contracts for technical assistance are normally placed with nonprofit contractors such as Lincoln, Rand, and Aerospace Corp.

Research Programs

First, I would like to dwell briefly on some of the Air Force philosophy behind its research program. As you well know, it is rather difficult to plan or predict areas of applied research which will produce the maximum advances in our military technology. In an attempt to solve this difficult task the Air Force develops what it terms long-range R&D objectives. These objectives are generated through careful, considerate examination by the technical and scientific community, by industry, and within the Air Force itself. Through the initiation of work statements to these various groups long-range project study requirements are undertaken. A careful review produces a

*The X-15 attained a speed of 2,905 m.p.h. on March 7, 1961 subsequent to this presentation.

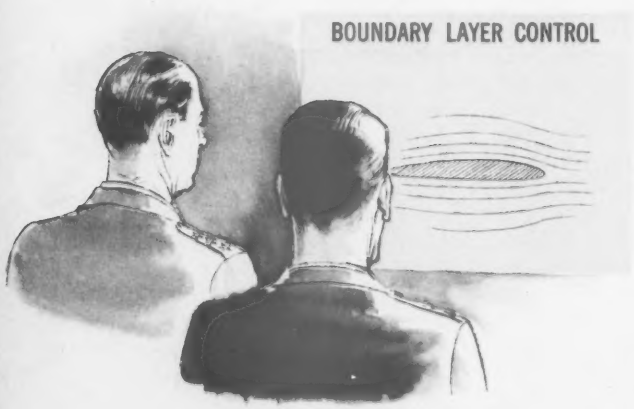
workable plan for identifying applied research tasks which should be undertaken today to provide necessary techniques and methodology for the future. These projects are in essence an exploitation through application of basic knowledge to solve military problems.

A very recent example which the Air Force finds extremely interesting with many possible applications is substantial progress being made in hydrogen, ramjet, and rocket technology. Certain proposed techniques, if proven practicable, may offer propulsive efficiencies much greater than those achieved with the best boosters available today. We plan to identify applied research knowledge that must be obtained before a military application can be made. This program has recently been undertaken and is known as the Aerospace Advanced Propulsion Program.

Another program that is not quite as futuristic-looking but was undertaken this past year is the Boundary Layer Control Program. This technique has been explored for some time and has reached a point where application of laminar flow boundary layer control to reduce drag is being attempted on a full-scale aircraft. It is predicted that this technique should produce aircraft with considerable extended range and improved performance.

Other significant advances have been made in such items as the air-bearing gyro, ion engine, Laser techniques, language translator and many more in the varied and important field of applied research.

Military departments have been for some time, are now and probably will continue to be, the greatest consumers of basic technology. The Air Force basic research effort is just a portion of the national research program. However, we find that we do not have the resources to apply to the whole area of basic research. We attempt to be selective and only probe those areas that are closely allied to our applied research program. To report any specific results in this area is very difficult. We can only state that our needs are continuing and that the program is being carried out by the most prominent scientists in this nation. Our primary intent is to provide selective support and encouragement in this very fruitful and essential fundamental effort.



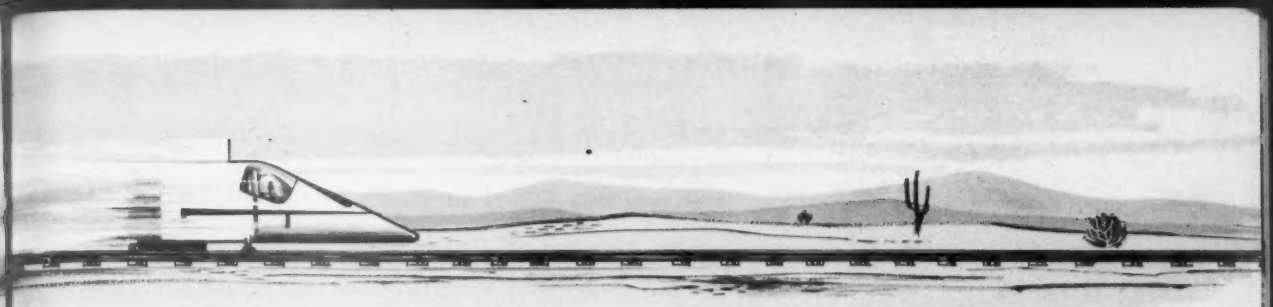
Command Operations

Highlights of achievements of the past year which I have just presented would probably not have occurred without one of the most important elements of research and development programs. This key is the management of these resources in a timely, effective, and highly efficient manner. We feel in the Air Force that our organizational structure which has been created and continues to be refined is a major factor in our success each year. The ARDC is the primary operating agency for the Air Force in carrying out its R&D program and it should be given considerable credit for these notable achievements. Its physical plant covers a wide geographical area and many unique and unusual laboratory facilities. Some 60,000 people make up this work force. Of the 22,000 military and 23,000 Air Force civilians, one-fifth of this total are scientists and engineers and approximately one-third of the total are technicians.

Air Force has the responsibility for the management and operation of the Atlantic Missile Range, a national resource. Plans have been initiated this year for the modernizing and extension of this range. The Air Force operates three major Missile and Space Vehicle Launch facilities, as well as several Vehicle Tracking Nets. In addition to the Atlantic Missile Range, the Air Force also operates the Eglin Gulf Range and assists in operating a portion of the White Sands Proving Ground in conjunction with the Army.

The two major captive sled test tracks are operated by the Air Force. These are used to test aircraft escape systems as well as missile components—an example of the latter being inertial guidance subsystems. We have a 35,000-foot track at Holloman Air Force Base and a 20,000-foot track at Edwards Air Force Base. Not as well known at the Flight Test Center as its experimental aircraft activities is our rocket test stand complex. First operational in 1952, this is the largest static rocket test facility in the Free World. There are 16 separate test stands; now under construction is the largest static test stand in the United States and will be used initially by NASA's F-1 one and one-half million pound thrust rocket.

Many other facilities and laboratories are the responsibility of the Air Force. A few of the more significant ones are the rocket engine test facility, von Karman Gas Dynamics facility, and propulsion wind tunnel facility at the Arnold Center in Tennessee; the electronics and geophysics divisions of our Cambridge Research Laboratories; the aeronautical laboratory in Dayton; the navigation, guidance, propulsion, structural



and static facilities also in Dayton; and our Aerospace Medical Facilities in Dayton, San Antonio, and Holloman Air Force Base.

A point which I made earlier, which I would like to repeat if I may because of my strong personal conviction of its importance to the Air Force research and development effort, is the acknowledgment of the importance of the dedicated, competent personnel directing the R&D effort. Our achievements each year can only be attained through effective management by these people. We must do everything possible to assist them in improving and strengthening their capability to perform their difficult task.

An item which I believe has been of considerable significance in increasing the effectiveness of the conduct of research and development in the Department of Defense has been the establishment of close working relationships between the offices of the Director of Defense Research and Engineering, the Assistant Secretary of the Navy for Research and Development, the Assistant Secretary of the Air Force, Research and Development, and the director of Research and Development of the Department of the Army. These working relationships have permitted a direct attack on many of the problems which interact across service boundaries, and I believe that the interrelationships which have been established have played a major role in the effective execution of the important R&D responsibilities of the Department of Defense.

In conclusion I would like to state the Air Force is actively and vigorously pursuing a goal of providing an imaginative research and development program compatible with our constant assessment of military requirements in support of our national strategy. Translation of these requirements into attainable developments within the state-of-the-art should be consistently undertaken with minimum risk through an orderly evolution of advanced developments and a knowledge of rigorous applied research fostered by our basic knowledge. We must also remain alert and responsive, never losing sight of one of the most important elements of this formula, the management of our precious resources by dedicated people, anxious to implement our national policy and preserve our democratic way of life.

Air Force Research and Development, in advancing the state of the art, promotes the expansion of our scientific estate as an invaluable national resource.

LET'S LOOK AT THR

by TSgt. JOHN K. O'DOHERTY, Airman Staff

IN JANUARY 1961 two B-58 *Hustlers* established six new world records over a closed-circuit course measured from Edwards AFB, Calif., to a point near Stoval, Ariz. Five of the records shattered by these line aircraft of the 43rd Bombardment Wing were previously held by Soviet Russia. The speed clocked for Aircraft No. 441 over the 1,000-kilometer (625-mile) course carrying 2,000 kilograms (4,400 pounds) of payload was 1,284.73 miles per hour. This flight, piloted by Maj. Harold E. Confer, thus set a record more than double the old figure of 639.18 miles per hour credited to Anatoli Lipko of the Soviet Union on October 30, 1959. Time for the 625-mile run—which is approximately the distance from Washington, D. C., to Chicago—was 29 minutes.

The second B-58, piloted by Maj. Henry J. Deutschendorf over the 2,000-kilometer (1,250-mile) flight, also turned out a spectacular performance. The recorded speed of 1,061.80 miles per hour toppled the old mark of 596.47 clocked by V. Kovaliev in a TU-104E on April 2, 1960.

But how meaningful are these world records? What do they contribute? Are they worth the time, effort, and money involved?

Some of the sound reasons for military interest in records and record breaking are obvious enough. For one thing, the American taxpayer who foots the bill for military airpower is entitled to some tangible, reassuring evidence of the use to which his money is put. And each flight which exceeds previous maximum

Capt. Joe Jordan set a new altitude record of 103,387 feet in the F-104. High-altitude capability plus speed

are vital for air superiority aircr Maj. Joe Rogers set a new speed rec of 1,525.9 m.p.h. in the F-106 *Delta D*

RECORDS

performance marks a step forward in the development of aviation. Lindbergh's historic flight to Paris in 1927 inspired a tremendous increase in public appreciation for the possibilities of aviation. This high tide of general enthusiasm, in turn, was responsible for the significant surge of progress during the 1930s.

High speed and high-altitude capability for fighter-interceptor aircraft are classic requirements of military aviation. As a measure of the progress that has been made it is interesting to note that in 1911 the world altitude record stood at 13,776 feet and the speed record at 82 miles per hour. The current world record for speed was set by Maj. Joe Rogers, USAF, on December 15, 1959, when he flew his F-106 *Delta Dart* at 1,525.9 miles per hour. Just four days earlier Capt. Joe Jordan chalked up a new record for altitude when he lifted his F-104 *Starfighter* to a height of 103,387 feet. (Both these marks for speed and altitude have been exceeded by experimental vehicles, but such performances do not constitute official records.)

For many years American policy for preserving world peace has been based on a policy of deterrence. One element of deterrence is the recognition by potential aggressors that the deterrent force is real and capable. World records held by USAF strategic aircraft demonstrate quite vividly that there is nothing illusory about American long-range capability.

The current world record for distance flown in a straight line by a jet aircraft without refueling was established by a KC-135. With Brig. Gen. William E. Eubank as pilot, the tanker took off from Tokyo, Japan, on April 7, 1958, and flew nonstop west to east to Lajes Field in the Azores. Total distance covered was 10,229.30 miles, and time clocked 18 hours 48 minutes. The old record for straightaway distance which General Eubank broke had stood for more than 10 years. This was a flight of a B-29 in August 1947 which covered 8,854.308 miles with Maj. O. P. Lassiter at the controls.

In September 1958 a B-52D set a new record for distance without refueling over a closed-circuit course. In a path extending over the area of Oregon, the Dakotas, and Arizona generally, the B-52 piloted by Lt. Col. Victor L. Sandacz covered a distance of 6,233.981 miles. Then in 1960 a B-52G flew over 10,000 miles in a nonstop, non-refueled flight. This, however, was an operational readiness test, and no attempt was made to establish an official record. Considering the degree to which aerial refueling techniques have been developed, it is clear that even these performances do not approach the total capability of USAF strategic aircraft.

Another heavyweight title, in the airlift category, rests with Lt. Col. J. K. Thompson who in December 1958 lifted a record payload of 117,900 pounds to an altitude of 2,000 meters (6,560 feet) in a C-133A. Numbers of events during recent years have demonstrated that superior airlift capability is an excellent instrument for building American goodwill and prestige abroad. At the same time, of course, airlift is an essen-

Strategic airlift is an integral component of deterrence. Lt. Col. J. K. Thompson proved capability of C-133A, lifting 117,900 lbs. to 6,560 ft.

tial component of overall strategic airpower.

In order to be recognized as official and acceptable to international aviation circles, all flights for the record must be conducted in accordance with rules prescribed by *Federation Aeronautique Internationale* (FAI), which has its headquarters in Paris. This body establishes official rules of procedure designed to insure authenticity.

Federation Aeronautique Internationale was organized at Paris in 1905 by a group of enthusiasts dedicated to sporting aviation. This was in the period when balloons and dirigibles shared equal importance with heavier-than-air craft, and no one had yet determined which direction burgeoning aviation would take. (New York already had a used-balloon dealer at the time, and a good four-passenger gas bag complete with wicker basket could be had for about $500.)

Representatives of Belgium, Germany, Spain, the U. S., Great Britain, France, Italy and Switzerland took part in the first FAI conference, and the initial draft of its regulations was completed on October 4, 1905. The air-records tribunal has since grown up until today 46 member countries subscribe to its rules. It is still, as in 1905, a nonprofit organization devoted to the development of aviation, and has become a highly respected arbiter over aviation records and contests.

Each member country now maintains a national organization within its own borders which represents the interests of FAI. In the United States, this organization is the National Aeronautic Association which has supervised all trials for world records and world "class" records in this country since 1922. In addition to the records recognized by FAI, NAA has supervised the trials for many records of purely national interest in the U. S.

When an attempt to set a new record is scheduled, NAA provides a Clerk of the Course who manages the event, and also appoints one or more stewards, timekeepers, or other officials as required. It is the duty of these representatives of NAA to verify compliance with the rules and to measure performance exactly.

FAI and NAA recognize five world records which are defined as absolute maximum performance regardless of the type of aircraft, but without the aid of aerial refueling. These world records are for maximum speed over a straightaway course; maximum speed over a closed "racetrack" course; maximum distance in a straight line; maximum distance over a closed course; and finally, maximum altitude.

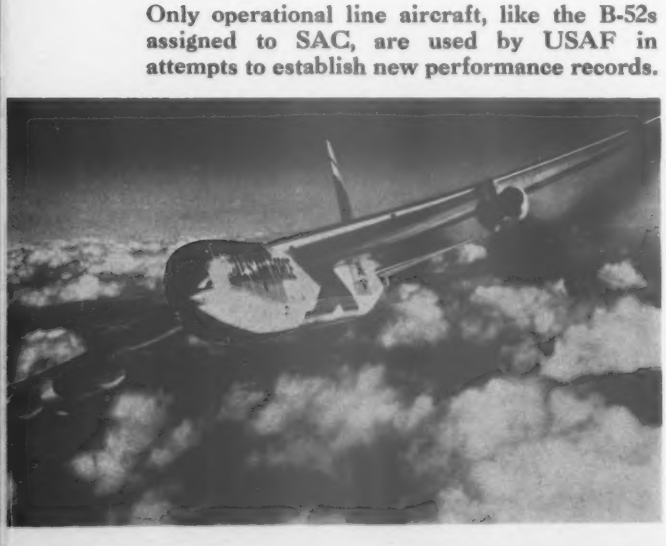
In addition to these there are numbers of world "class" records which distinguish between different types of aircraft—as, for example, between jets and piston engines—and also for helicopters, gliders, seaplanes, even balloons and dirigibles.

USAF uses only operational line aircraft for record trials. This is not a requirement imposed by FAI or NAA rules, but rather a matter of USAF policy. The Soviet Union uses research aircraft for record attempts and, in fact, holds a number of records which have little or no value in the military sense. Some small countries with limited resources and relatively meager military establishments also use research aircraft to spur national interest in aviation.

Record attempts by USAF crews are always performed within the framework of the regular training program. Time in the air comes out of the normal budget of flying time allotted to the organization. This, too, holds true for all spectacular performances such as air shows, Armed Forces Day demonstrations, and similar public displays.

How long can a world record be expected to stand? There is no way to tell, and a proud champ may find himself shot out of the saddle even before his performance has been certified by FAI. But some records have stood for a considerable time. Germany has held the airline distance record for airships for quite a spell. Dr. Hugo Eckener flew the Graf Zeppelin from Lakehurst, N. J., to Friedrichshafen, Germany, a distance of 6,384.500 kilometers or 3,967.137 miles. That occurred October 29 to Nov. 1, 1928.

Only operational line aircraft, like the B-52s assigned to SAC, are used by USAF in attempts to establish new performance records.



FLYING BROTHERS '61

Colonel Wallace authored the concept and objectives for this year's **Flying Brothers** and headed the USAF delegation which, together with the PAF staff, produced the detailed operations plan.

No stranger to the Pacific air forces, Colonel Wallace is known to them for participation in the 1958 and 1959 **Flying Brothers** events and for his annual visits in connection with his regular assignment as Chief, PacAF Operations Assistance Team.

by COL. JACKSON S. WALLACE, Hq PACAF

AS THIS ARTICLE GOES TO PRESS, over 400 airmen, representing the United States and ten friendly countries of Asia are converging on Clark AB in the Philippines to participate in *Flying Brothers 1961*.

More formally known as the U. S.-Asian Fighter Weapons Conference, *Flying Brothers 1961* is the third of these annual events to be held at that base. As the name implies, *Flying Brothers* is a get-together of the various friendly air forces in the Pacific Command area. For ten days the conferees, including aircrews, ground crews, and official observers, will live and fly together in an air of harmony and single-minded purposefulness. This year's event is designed to promote good will and to exchange thoughts and ideas relative to common problems of air defense.

As in the past, *Flying Brothers 1961* is again co-sponsored by the Philippine Air Force. A combined PAF-USAF staff, working closely together, produced the operations plan for the event and will guide and direct its execution. The accomplishment of these tasks alone illustrates the ability of two friendly services to overcome language barriers, ethnic differences, strange environments,

ROK F-86 jets will again fly strafing missions in gunnery phase of the 1961 "Flying Brothers" meeting.

and other obstacles to work together in an air of friendship and complete cooperation.

With air defense as the theme, teams from the air forces of Japan, Korea, China, Philippines, and Thailand plus those representing Pacific Air Forces and Pacific Fleet are flying seven non-competitive missions during the ten-day period which started on April 24. All are using F-86F aircraft except for the Chinese Air Force which is employing F-100As, the USAF with F-100Ds, and the USN team with F-8U *Crusaders*.

Daily activities for the 36-man teams include an area orientation mission to familiarize the pilots with the relative location of alternate airfields, navigational aids, aerial gunnery ranges, and with local procedures and facilities. With flying safety of paramount importance, this mission is considered highly important and is being flown by all five pilots of each team. Weapons Directors and ground crews, constituting the remainder of each team, are similarly indoctrinated with procedures and facilities pertinent to their functions.

Three air-defense missions, culminating with aerial gunnery on a banner target towed by Philippine Air Force F-86Fs, follow the area orientation mission. The first is for practice and is flown by all five team pilots. The second and third are "for real" and the fifth pilot and aircraft are used only in case of a ground abort. These missions are initiated from an air-defense alert posture and this is where the team Weapons Director gets into the act. The "bogie," which is a 6′x30′ banner, towed by an F-86F, is identified to him on the radar scope in the ADDC. The Director then determines the direction, speed, and altitude of the bogie, scrambles his fighters at the proper time, directs them to the intercept point, and recovers them back at home plate. The operative words here are "at the proper time" because the tow aircraft makes only one pass through the range, and gunnery, of course, is not permitted outside range limits.

The impressive *Sidewinder* (GAR-8) missile also receives its share of attention. One captive mission and one live firing mission are on the books and, as might be expected, have attracted a great deal of interest. The live mission involves a GAR-8 launch against a five-inch target rocket and is being flown by all team pilots. Special authority was granted by Headquarters USAF for the expenditure of 35 missiles during this important event.

The flying phase winds up with a combined formation of all teams. Since May 2 is Phillippine Air Force Day, the formation will be led by a Philippine Air Force pilot and will overfly selected locations on Luzon, in honor of the Philippine Air Force.

Backing up a bit, mention should be made of the academic schedule which is threaded throughout the event. Included are presentations by the Instrument Pilot Instructors School faculty from James Connally AFB, Texas. These presentations are pointed at how to conduct the most effective instrument training program. Preceding the GAR-8 missions will be a detailed briefing on *Sidewinder* tactics and techniques. This briefing lays the groundwork for both the captive and the live missions described earlier. And last, but not least, are presentations by the Philippine Air Force on the subjects of airborne intercept radar and air-defense ground environment. To obtain maximum absorption and widespread dissemination of the material presented, the material is translated into each language represented. Augmenting this formal academic

Republic of Korea jets on the ready line. Pilots of the U. S. and Pacific-Asian nations fly side by side to exchange know-how and promote the sense of unity.

Scene from last year's meet, ground crewmen of the Philippine Air Force reload an F-86. Combined PAF-USAF staff plans and directs the entire operation.

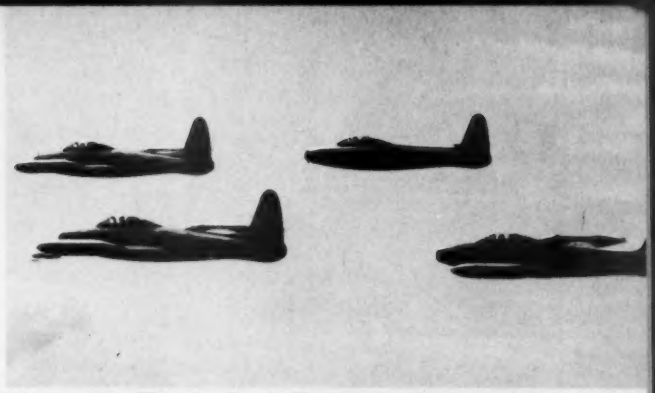
phase are flightline demonstrations and discussions by factory representatives for benefit of team ground crews.

Another feature of *Flying Brothers* this year is the seminar phase, to be conducted under the supervision of Air University representatives, skilled in the art of guiding group discussions and in obtaining effective participation. The seminars are of primary interest to the considerable number of official observers in attendance. Results of these seminars are also reproduced into the language of each country represented which, in addition to those already mentioned, includes Burma, Cambodia, Laos, Indonesia, South Vietnam, and the British Commonwealth.

Opportunities to relax and to "rub elbows" with each other have not been overlooked. Occasions such as a formal reception, the Philippine Air Force Ball, and the Dining-in night permit the renewal of old friendships and the establishment of new ones. Guided tours to Manila, Baguio, and other points of interest provide relaxation and a chance to observe Philippine cultures.

Visitors to *Flying Brothers* will be impressed with the famous *Flying Brothers* insignia, redesigned for 1961; with the playing of the *Flying Brothers* March, a stirring composition by Lt. Col. Buenaventura, PAF; by the colorful display of flags representing the participating nations; and with the atmosphere of genuine friendship prevailing among all ranks—from the generals down through the lowest grade of airmen.

International politics, differences in race and religion, and language barriers are forgotten in the pursuit of our common interests of freedom and airmanship and in recognizing that friendly air force people are truly brothers under the skin.

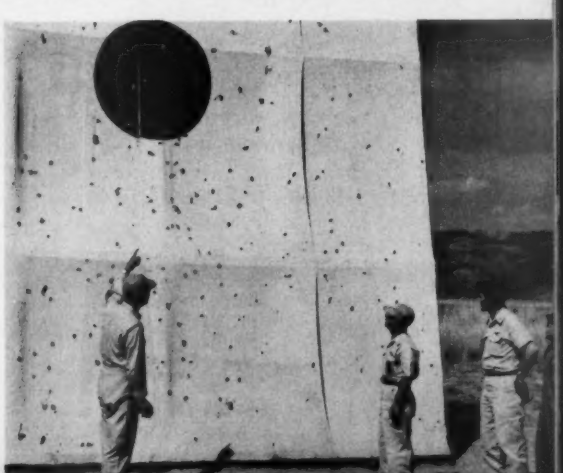


F-86s of the Thailand Air Force streak toward an intercept in practice scramble mission last year. Each nation is represented by team of five pilots.

Emphasis is on cooperation in air defense. Here in 1960, U. S. officer explains working of radar scope. Over 400 airmen of 11 nations will join for '61 meet.

Last year practice bombs were used. The 1961 meet will feature use of the Sidewinder in air defense. This year Republic of China airmen will fly F-100s.

Once again in '61 targets at Clark AB will be ripped by the gunfire of the airmen who participate in Flying Brothers conference.



*Saving Live*vi

by 1st Lt. CARROLL S. SHERSHUN, Airman Staff

ED RAY'S HANDS had always been a source of pride to him, especially when he saw "his" F-104 streak off the runway to another successful mission. For more than seven years Sergeant Ray had been a USAF aircraft mechanic. Pliers and wrenches were the tools of his trade, and he knew what to do with them. He was used to using his hands, which had hardened so much that his vise-like handshake was hard to forget.

But as Ed looked at his hands now, his pride deserted him. For a moment he trembled. This wasn't a metal bird in front of him. It was a human being; a man who would be dead within minutes unless Ed made the right moves. The man had been thrown from a wrecked car. His left leg was bleeding badly. His life rested in Ed's fingertips.

What should he do? He had to stop the bleeding. But how? Ed wanted to press down hard on the gash. Moving quickly now, he placed his freshly laundered handkerchief over the wound and put direct pressure on it with his strong hands. It worked. The bleeding stopped. Ed's mind was clear now, his nervousness gone. He treated the victim against shock, kept the gash covered to prevent further contamination, and checked to make sure the man wasn't having trouble breathing.

Ed had made the right moves. Luckily he had remembered his first-aid training. Like many other airmen he had discovered suddenly and unexpectedly how important that training can be.

Today, even more than in the past, the Air Force Medical Service is emphasizing continuing first-aid training. Primary stress is centered on the "self-aid and buddy-aid" program. Training kits—designed to help non-medical personnel teach first aid to each other—have been developed by the School of Aviation Medicine. Under realistic emergency or disaster conditions all USAF personnel are expected to know and give first aid. Since wounds are the most common condition needing immediate treatment, the emergency medical-care kits stress three life-saving steps:

1. Stop the bleeding.
2. Prevent or treat shock.
3. Protect the wound.

A valuable USAF guide, *First Aid For Airmen* (AFP 35-5-3), outlines proper actions in applying these three steps.

Sergeant Ray had the right idea when he stopped to inspect the injury and then applied direct pressure to the wound. Uncontrolled bleeding might have caused or increased shock and finally resulted in death. Some advocate the use of key pressure points to stop bleeding; however, this method generally calls for considerable practice by the person giving first aid. Valuable time can be lost while the inexperienced person gropes for the proper pressure point. The least desirable method for controlling bleeding, one which should be used only as a last resort, is the tourniquet. Delay in medical treatment may require amputation of the member to which a tourniquet has been applied. It should be used only when blood is gushing from the wound and direct pressure attempts have failed.

After bleeding has been controlled your next step is to treat the patient for shock. This should be done whether or not symptoms of shock are present. Reassure the victim and make him comfortable by removing bulky items and by loosening clothing. Move him as little as possible; handle him gently. Make certain there are no broken bones before straightening him out. Keep him warm. If he is unconscious, place him face down with his head turned to one side.

The third life-saving step, protecting the wound, should be kept in mind throughout the treatment of a casualty. A dressing held in place by a bandage is the best method for protecting the wound from further contamination. But it is important that you don't touch the side of the dressing which goes next to the wound. It's equally important to refrain from pulling clothing over the area to be treated.

In cases where breathing has stopped and artificial respiration is necessary, the most important thing to remember is to begin immediately. Don't waste time moving the victim to the ideal location. Start at once. It has now been proved that the exhaled air (mouth-to-mouth or mask-to-mouth) method is better than any other. Basically it involves placing the victim on his back, tilting his head back and his lower jaw forward in a "sword swallowing" position. After air passageways have been cleared and the victim's nose

ve with Your Hands and Breath

held shut, air is blown into his lungs through airtight mouth-to-mouth contact. Air is allowed to escape from the victim's chest merely by separating lip contact.

These are but a few of the important first-aid actions which could save a life. Many others, including first aid for drowning, heat exhaustion, heatstroke, poisoning, snake bite, and various other accidents, are equally important when treatment is required. Properly administered treatment has saved thousands of lives. In first aid, especially, practice makes the difference.

Artificial Respiration

Begin immediately. Don't waste time moving the victim to the ideal location; don't wait for mechanical equipment.

Step 1. Turn the victim on his back.

Step 2. Clean the mouth, nose and throat. If they appear clear begin exhaled air artificial respiration immediately. If foreign matter is present, wipe it away quickly with a cloth or by passing the index and middle fingers through the throat in a sweeping motion. (See fig. 1.)

Figure 1.

Step 3. Place the victim's head in the "sword swallowing" position. The head must be placed as far back as possible so that the front of the neck is stretched.

Step 4. Hold the lower jaw up (see fig. 2). Approach the victim's head preferably from his left side. Insert the thumb of your left hand between the victim's teeth at the

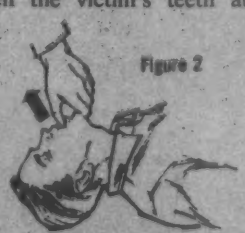


Figure 2

Figure 3

midline. Pull the lower jaw forcefully outward so that the lower teeth are further forward than the upper teeth. Hold the jaw in this position as long as the victim is unconscious. A piece of cloth may be wrapped around the thumb to prevent injury by the victim's teeth.

Step 5. Close the victim's nose by compressing it between the thumb and forefinger of the right hand.

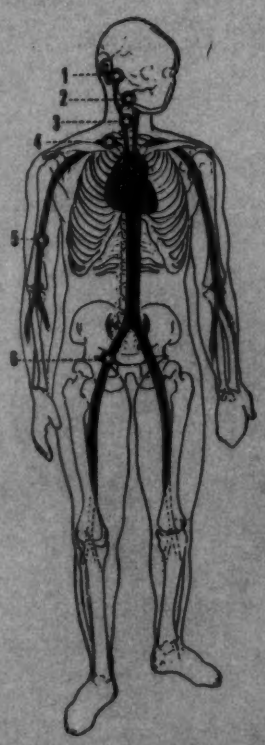
Step 6. Blow air into the victim's lungs. Take a deep breath and cover the victim's open mouth with your own open mouth with airtight contact. Blow rapidly until the chest rises. Blow forcefully into adults and gently into children (see fig. 3).

Step 7. Let air out of the victim's lungs. After chest rises, quickly separate lip contact with the victim, and allow him to exhale by himself. Repeat lung inflations 12 to 20 times per minute for an adult.

Control of Bleeding

Uncontrolled bleeding has cost many lives. To stop bleeding, first apply pressure to the wound itself with a dressing, or, if necessary, with some substitute such as an undershirt. Place the clean dressing against the wound and apply firm pressure. When blood is gushing from a wound it may be stopped by hand or finger pressure at various points on the patient's body (see fig. 4). Use of pressure points generally calls for considerable prior practice by the person giving first aid. A tourniquet should be applied only as a final life-saving resort since resultant loss of circulation may cost the victim his limb.

Pressure points (fig. 4): 1. In front of ear. 2. On jaw. 3. In neck. 4. Behind collar bone. 5. Inner side of upper arm. 6. In groin.



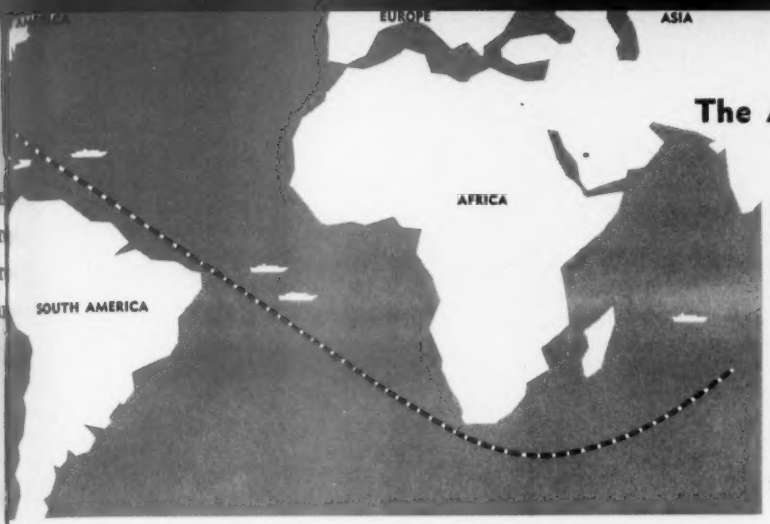
There are probably dozens of airmen around the world who would nomi
their own organization as candidate for "busiest outfit in the Air For
But they will have to go some to top the versatile 6560th Operations Gr
as it flies support for the 9,000-mile stretches of the Atlantic Missile Ra

BUSIEST OUTFIT

SUPPORT, in the highly unusual case of the 6560th Operations Group at Patrick Air Force Base, is a thoroughly elastic term, stretching as it does from routine shuttle service in *Gooney Birds* to highly technical tracking and recovery missions over the Atlantic Missile Range. They fly jets, too, on missions that make their own special contributions to the spectacular accomplishments associated with Cape Canaveral.

Operated by the Air Force Missile Test Center (AFMTC), which has its headquarters at the sun-drenched installation near Cocoa Beach on the east coast of Florida, the Atlantic Missile Range is the Free World's largest instrumented range for flight testing high-altitude, long-distance missiles and rockets. Although operated by the Air Force, with AFSC as parent command, the services and facilities of the range are available to all branches of the military service, as well as other government agencies and civilian corporations engaged in research and development. The range extends from the AFMTC launch sites at Cape Canaveral, over the expanses of the South Atlantic and beyond the tip of Africa, terminating in the limitless, watery wilderness of the Indian Ocean.

For the first few thousand miles of flight down-range, missiles are tracked by radar on the mainland of Florida and by a chain of telemetry stations strung along the islands of the Caribbean. USAF picket ships then take up the gap between the West Indies and the islands of Fernando de Noronha and Ascension in the middle of the South Atlantic. Ascension Island lies 4,401 nautical miles southeast of Cape Canaveral and nearly 1,500 miles from the coast of Brazil. The tracking and



The Atlantic Missile Range, beginning with Station No. 1 at Cape Canaveral, extends down into the South Atlantic and beyond. The men of the 6560th cruise the vast empty expanses of ocean in their JC-54 flying laboratories.

IN THE AIR FORCE

recovery functions for the remaining four to five thousand miles of the range depend largely on the airborne laboratories flown by the 6560th Operations Group.

But tracking missiles and recovering nosecones and capsules comprise only one facet of the many-sided mission. Altogether the 6560th employs eight types of aircraft in fulfilling the requirements imposed by AFMTC. Venerable C-54Ds are used to fly air logistic missions to eight of the island stations extending into the Caribbean as far south as Antiqua, Antilles, WIF. Each island station is manned by a technical community of from 8 to 200 men, depending on the particular type of equipment in use. Flight schedules call for an average of eight round trips per week with stops at each island on both inbound and outbound flights.

Never Dull

During a recent typical 30-month period this side-bar mission involved some 14,000 flying hours in which 26,000 tons of freight and 25,000 passengers were moved. Although such air logistic missions are routine, there is nothing dull or monotonous about this down-range shuttle service. Even for the regular ferrying crews each sunny island has its own particular features of interest. There is Grand Turk Island, discovered in 1512 by Ponce de Leon and named for a native species of cactus resembling a Turkish fez. Eleuthera was first settled in 1646 by a group of English Loyalists who left the American colonies in a huff. They called themselves Eleutheran Adventurers, from the Greek word meaning freedom.

Another logistic responsibility shouldered by the 6560th requires the use of SA-16 amphibians. These flying boats are used to supply isolated groups in areas where no conventional airstrips are located. The *Albatross* is quite capable and comfortable in the tiny coves and bays that cut into the coastlines of the islands.

Out from Cape Canaveral—which is Station Number One in the Atlantic Range—the 6560th performs an important service in JC-131 and JB-57 aircraft by flying check missions for the elaborate instruments located on the Cape. The B-57s fly simulated missile courses down-range from the launching area so that tracking devices may be calibrated and coordinated. This instrument-check program is a continuing year-round requirement as new lessons are learned and new information is gleaned from each launch at the pads.

Of all the 43 aircraft used by the 6560th, the most intricate are the JC-54s, described as flying telemetry laboratories which track ballistic missiles or space vehicles as they blast spaceward on their journeys and re-enter the atmosphere. ECM operators and scanners are used in location of re-entry vehicles after which the aircraft commander directs ocean vessels to the scene for recovery operations.

The crews of the JC-54s have been in the nosecone recovery business for more than two years now. Lt. Frederick K. Duell, duty pilot and keeper of the organization scrapbook, notes that more than 20 have been recovered and in over a year and a half the aircrews have never failed to support a scheduled missile launch.

A mission of last year, while perhaps further from home than some, illustrates the type of chore that regularly falls to the 6560th. Two JC-54s carrying a complement of 39 airmen—aircrews, maintenance people,

and telemetry specialists—took off from Patrick AFB for Durban, on the southeast coast of South Africa.

Now The Day

Now it is the appointed day. About four hours in advance of the scheduled missile launch from Cape Canaveral, two JC-54s with full loads of fuel fly south over the Indian Ocean. In the anticipated impact area, far out from Durban, South Africa, and away from shipping lanes, a surface vessel stands by to pick up the awaited signal as the aircraft cruises systemically overhead. Here, deep in the outfield, is the area to which the 9,000-mile *Atlas* shot was lobbed.

Time passes in the cabin of the aircraft. Tension mounts as the atmosphere of hushed expectancy becomes charged with electricity. All hands not employed at the instruments crowd at the windows, straining to catch sight of the re-entry.

Suddenly there is a shout as the signal comes in from the missile, still a thousand miles away and streaking through space. The watchers at the windows press closer. Then high in the sky a brilliant streak of light streams across the heavens like a shooting star as the body of the rocket burns up and disintegrates in the atmosphere. The nose capsule—still transmitting its signal—leaves a slight vapor trail as it streaks down toward the sea. Small fragments of the burning rocket body can be seen streaking down through the upper air.

As the capsule strikes the surface of the sea, the telemetry signal dies—as planned—and the exact moment of "splash" is recorded on tape. This particular shot is a breeze. The shot is right on the money and no recovery is required. In other cases where recovery is required, an electronic and visual search is begun and as soon as the "package" is located the aircraft drops to 500 feet, and sea dye is dropped which marks the spot of the package now bobbing on the waves only a few miles from the waiting vessel. The ship is directed to the spot and the ship's crew have their prize on the deck within about an hour.

String of Firsts

In March 1959, crews of the 6560th located the first IRBM nosecone ever recovered, and the first ICBM cone the next month. They spotted the first missile mail package and located the nose of the first full-scale, 5,000-mile shot of the *Titan*. Then in September 1959 they successfully spotted the *Mercury* capsule which landed in the sea near Antigua, one of the down-range stations.

Unfortunately, not all recovery missions follow a pattern of orderly precision. Capsules have been known to fall short—or over—and weather does not always cooperate completely. When the monkeys, Able and Baker, went on their rocket journey, it was thought for a time that they were lost. Efforts by surface vessels were abandoned after seven or eight hours, but the patient aircrews continued to fly the search pattern until the animals were found. The spot was marked with dye and although the capsule sank, divers were able to recover it because of the markers dropped by 6560th aircraft.

Then there was the *Discoverer XV* shot, launched out of Vandenberg AFB over the Pacific Missile Range, and supported by the 6560th flying out of Christmas Island in the south-central Pacific Ocean. This was a heart-breaker. Although somewhat off course, the capsule was spotted from the air with little difficulty. But heavy seas and the distance involved prevented surface ships from approaching to make the pick-up. Using two JC-54s the airmen kept the capsule under surveillance for 36 hours, with the aircraft shuttling back to Christmas Island in turn to take on fuel. But an unfriendly Fate held all the cards on this occasion, and the capsule was lost to the sea.

Sometimes human factors enter into the capsule-recovery mission to make a difference. In January 1961 an aircrew of the 6560th located the first *Blue Scout*

Mission completed. This shows actual recovery of nosecone fired from Cape Canaveral Oct. 13, 1960.

Two JC-54 flying laboratories rest on the runway at Ascension Island. Next mission may take them down to the tip of Africa to spot nosecone or capsule.

fired from Canaveral; but this one wasn't easy. The capsule landed some 400 miles northeast of Antigua, a full 175 miles short of the programmed impact area. The waiting JC-54 moved back up-range to fly a search pattern at 8,000 feet. The weather was poor, and there was nothing to see but empty ocean as the aircraft crisscrossed over the search area.

A2C David Prawde stubbornly refused to believe that the *Sarah* scope—which should pick up the capsule—was working properly. He dismounted the device, moved to the back of the aircraft and began to tinker. The pilot brought the plane down to 1,000 feet while everyone else strained their eyes at the windows.

Within two hours Airman Prawde announced that he had found trouble in the scope—a loose wire in its innards. He remounted the thing in proper position, and looked at it expectantly. Seconds later his voice rose in a shout, "There it is," and excited companions rushed to peer in the direction he indicated.

Sure enough, there it was bobbing briskly on the waves, and the 6560th chalked up another success. This little gem, incidentally, measured only 22 inches across —a tiny spot to be lost in thousands of square miles of ocean.

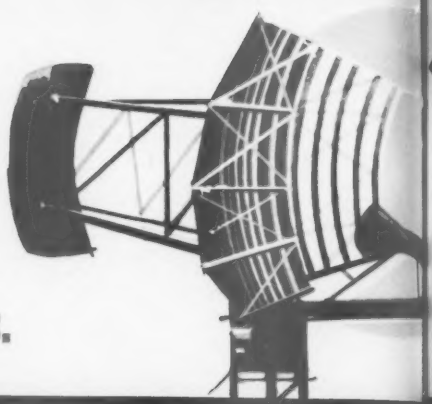
While numbers of civilian employees are used on the island tracking stations, all the telemetry specialists flying with the JC-54s are uniformed Air Force technicians. Of the 75 officers in the outfit, all but a few are rated and of the flying types; all participate in the test-support flying, from the commander right on down. Average flying-experience level runs about 4,000 hours, with the low man on the totem pole possessed of about 3,000.

This year some of the aircrews will transition over to C-130s which will enter the telemetry tracking program. But these people take progress easily in their stride. "What we really need," says one pilot, "is KC-135s. Then we won't care how far they shoot 'em, we'll find them."

Col. George E. Cranston, Commander of the 6560th Operations Group, is understandably proud of the record his organization has chalked up. But, busy as they are in the air, this outfit has its feet on the ground. "It takes a lot of flying and a lot of cooperation to get this job done," says Colonel Cranston. "But if there is one thing more than any other that deserves credit, it is good maintenance. This is a basic necessity; you just can't go without it."

This is the highly complex electronic telemetry equipment installed in the JC-54s of the 6560th Operations Group.

A rain of weapons—
bombs, missiles and rockets—
bombard America regularly.
But these weapons make no sound,
kill no people, and destroy no cities.



THE SILENT W

ON A PEACEFUL WINTER NIGHT NOT LONG AGO, a battle raged above the United States. Bombers bore in from the north, clashed with flashing interceptors and air-defense missiles, and simulated release of "bombs" on sleeping American cities.

Warnings sped from radar sites, jolting SAGE centers and Air Defense alert crews. For several hours, combat operations centers across the nation were engaged in a full-scale war. But it was a peaceful war —a silent war, waged electronically.

Today, electronics makes possible realistic combat training that would otherwise be impossible because of the prohibitive costs. Yet the need for realism in training grows greater as weapon systems become more complex. Electronics provide this realism.

For the SAGE operations people of the North American Air Defense Command, training is provided by prepared tapes which produce frighteningly realistic scope presentations. Developed by the Systems Development Corporation, the program of electronic warfare is called the SAGE Systems Training Program (SSTP). The combat situations presented by SSTP at the SAGE Direction Centers could only be duplicated by an actual attack or by filling the skies with American jet bombers.

With the SSTP tapes, however, any desired aerial situation can be depicted. Various weather conditions, radar "clutter," and all possible enemy-instigated electronic jamming can be duplicated.

The tapes fed to the high-speed electronic digital computers are prepared in Santa Monica, Calif., for each air defense sector which in turn feeds in its own unique, environmental problems. Sectors can run their exercises independently, or in conjunction with other sectors in a nation-wide battle.

In a systems training mission, every agency with which the individual sectors normally deal can be simulated. These include such units as picket ships, aircraft, and air route traffic control centers. Scripts are prepared for each of these with SAGE controllers "starring" in various roles, including those of interceptor pilots.

In a continent-wide air defense exercise, separate and corresponding tapes and scripts are synchronized so each sector has a picture identical to that of the other sectors. Their Sector Commanders get the same complete picture of the overall exercise just as they would during a real attack. And an added advantage to the system is the accurate, objective record of the entire operation which is evaluated, critiqued, and studied after each exercise.

SAC's Electronic War

The Strategic Air Command also relies on electronic devices for training. For several years now, Radar Bomb Scoring Detachments have been recording the hits and misses of SAC's bomber crews which have virtually "destroyed" most of America's major industrial centers. These mobile bomb-scoring detachments set up their equipment in the target area, and the jet bombers simulate the release of their weapons by an electronic pulse which registers on the bomb-scoring

equipment far below. There are currently 26 radar scoring detachments stationed in target complexes on a long-term basis.

Now, to provide crews with a wider range of targets to strike in their simulated attacks from high and low altitudes, these bomb scorers are using special Air Force trains. These trains will transport mobile crews which will stay at each target site for about 45 days. The first of these pulled out of Hill AFB, near Ogden, Utah, late in February and three radar bomb-scoring trains are expected to be in operation by September.

SAC training officials said the mobile scoring units will present crews of B-47, B-52, and B-58 bombers with more realistic tests of navigation and bombing accuracy against unfamiliar targets. In high altitude strikes, bombers will approach their targets at 30,000 to 40,000 feet. Low-level simulated attacks will begin from about 2,000 feet. In the interest of air safety, all target and route selections will be coordinated with the Federal Aviation Agency and areas of dense population and heavy air traffic will be avoided.

Equipment aboard the trains also will be used in attempts to jam the bombers' radar during runs to the target. Bomber crews, using electronic countermeasures gear, must offset the jamming procedures to pinpoint their targets. When the bomb is theoretically released, scoring equipment will measure the accuracy of the drop within a few feet.

Communications gear aboard the trains will be used to relay scores to the bombers' home stations. The same equipment will keep the trains in contact with SAC command posts which direct and monitor training operations.

The three trains, composed of existing U. S. Army stock from the Ogden General Depot, are being modified to accommodate the radar tracking and scoring equipment. There are about 60 Air Force radar technicians on each train. In addition to these men are the crews who relocate the train each 45 days and furnish other support. Each train will consist of 10 cars.

Civilian train crews will move the trains between target complexes, a procedure similar to that used by the Air Force in tests last summer of the *Minuteman* intercontinental ballistic missile train.

SLANTS ON SPACE

The amount of heat a planet receives from the Sun is inversely proportional to the square of the distance between the two bodies.

Thus Mercury, the first of the inner planets with a mean distance of about 36 million miles from the Sun, gets in the order of seven times the amount of solar heat which reaches the Earth, whose mean distance is roughly 93 million miles.

Astronomical observatories have reported readings of 644 degrees F. for points on Mercury's surface when directly beneath the Sun at mean distance. The readings for the areas jump to 779 degrees when the planet is at perihelion, or closest approach to the Sun, when the distance shrinks to approximately 28.6 million miles.

Venus, with a mean distance from the Sun of 76.17 million miles, receives about twice the solar heat ration we get. However, the extremely dense atmosphere which always shrouds this mystery planet reflects about twice as much sunlight back into Space as our atmosphere does, so data about its surface temperatures are uncertain. Most information extant about temperatures relating to Venus concern those at the top of its atmosphere or somewhere in the atmospheric layers beneath. Even these show a wide range of readings obtained by different astronomers.

The same has been the case with efforts to determine temperatures at the bottom of the atmosphere of the planets, utilizing radio observation techniques. Here the reading range has proved even wider. For example on a wave length of 9.4 cm. temperatures of 405 degrees Fahrenheit have been reported. On a 3.15 cm. frequency, however, the temperature determination jumped to 603 degrees.

Mars, with a mean distance from the Sun of almost 50 million miles greater than the Earth's, receives only about four-ninths the amount of solar heat per surface unit that we do.

If you see temperatures from Space exploration given in so many degrees Celsius, don't think you have another thermometer scale to reckon with. It is the same as the one which has so long been referred to as Centigrade. Anders Celsius, a Swedish astronomer who devised this scale in 1742, fixed on zero for the freezing point of water and 100 degrees for its boiling point, hence the designation, Centigrade, from the Latin for 100 gradations.

Scientists now feel that in belated justice this scale should be linked with the name of its originator, as has been the usage with the Fahrenheit scale which was devised in 1714 by the German physicist, Gabriel D. Fahrenheit. While the Fahrenheit scale is familiar on household and clinical thermometers throughout the English-speaking world, it is now used for few scientific purposes, the Celsius (or Centigrade) system being preferred.

The deepest recorded penetration of the Earth's environment by an asteroid brought the baby planet, *Hermes,* within an estimated 475,000 miles of our globe near the end of October 1937. Its midget diameter, variously calculated as between 0.75 and 1 mile, made it a difficult celestial object to observe and astronomers had all too brief a time during this 1937 pass for studies looking to the determination of its orbital pattern with reasonable accuracy. One set of computations based on available data, however, produced the finding that at certain times *Hermes* could approach as close as some 221,000 miles, or nearer Earth than the Moon is at its average distance of 239,100 miles.

As in the case of the Earth, the northern hemisphere of Mars has its summer when the planet is the greatest distance away from the Sun. A Martian summer lasts about 182 days.

Because of the eccentricity of Mars' orbit, however, the planet's southern hemisphere gets shorter summers—an estimated 160 days—and has longer winters, some 182 days as compared with the usual 160 days in the northern hemisphere. To take the other seasons, spring runs 146 days in the southern hemisphere and autumn, 199 days. In the northern hemisphere the duration of these two seasons is just the reverse, with spring in the vicinity of 199 days, and autumn, 146 days.

Eleven of the natural satellites in the Solar System keep their respective planets rather distant company, moving in orbits of more than a million miles away and on up to nearly 15 million miles.

Jupiter, with a family of a dozen moons, has the most remote satellite whose mean distance is placed at between 14.7 and 14.9 million miles. This is the satellite still known as IX, the numerical order of its discovery back in 1914, because no official name has yet been given it. Two other of the giant planet's moons are lower down in the 14-million mileage bracket; one has a mean distance of some 13 million miles; then there are three in the 7-million-miles-plus group, and lastly comes one which is slightly more than 1 million miles distant.

Saturn's nine satellite companions include one with a mean distance shading the 8-million-mile figure, and another about 2.2 million miles away. To complete the list, one of Neptune's pair of moons has a mean distance of 3.5 million miles.

—WILLIAM A. KINNEY

Para-scuba Medics train to support space flight

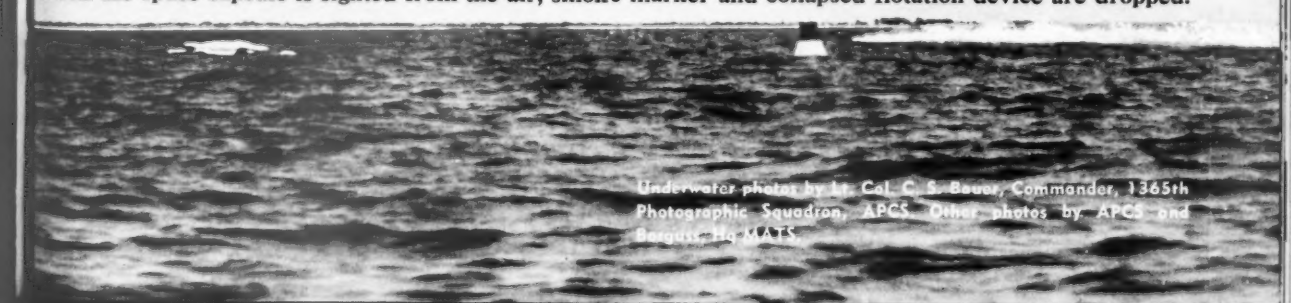
Nick Klimis, at left, helps Joe Williams make final adjustment in parachute which is fitted over scuba tanks. The word scuba stands for Self-Contained Underwater Breathing Apparatus.

When the first American astronaut embarks on his historic journey into space, the event will receive team support from all branches of the military service. In preparing for this new experience in human history, every conceivable contingency must be provided for. No effort will be spared to insure the safe return of the astronaut.

Here is how one Air Force team of the Air Rescue Service is training to meet a possible specific requirement. This hypothetical training situation assumes that the space capsule has landed in the sea, but is some distance away from the nearest pick-up ship. It is essential that the capsule remain afloat for an indefinite time, while retaining stability even in rough water. In addition, the astronaut may require first aid or other assistance.

The two parachuting, scuba-diving, medical technicians in this particular team are MSgt. Nicholas Klimis and TSgt. Joe L. Williams of the 48th Air Rescue Squadron, Eglin AFB, Fla. Sergeant Klimis has made more than 370 jumps in his 13-year career, while Williams follows close with more than 310. Williams was the first man to make an overwater jump with the new parachute rigging designed to fit over scuba air tanks.

When the space capsule is sighted from the air, smoke marker and collapsed flotation device are dropped.



Underwater photos by Lt. Col. C. S. Bauer, Commander, 1365th Photographic Squadron, APCS. Other photos by APCS and Brigade Hq MATS.

Boarding the aircraft is a chore in itself. Here Joe Williams receives a needed assist fore and aft. Weight of gear is 130 pounds.

And another assist through the aircraft door from Dropmaster McCall as Joe jumps with full gear into the ocean near the spot where the capsule floats.

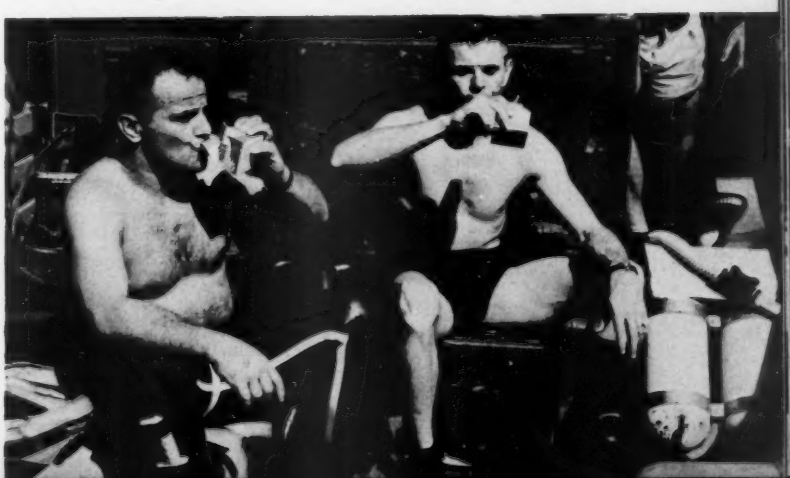
At left, bag in position is fastened by purse string pulled tight. Next, bag is inflated by compressed gas cylinder carried by divers.

At right: final inspection above and below water tells divers that everything is in order. Capsule now will ride easily for an indefinite time.

Swimmers quickly retrieve drifting flotation device and, working above and below water, skillfully arrange the bag in position around rim of the vehicle containing the astronaut.

Job done, swimmers climb aboard float to wait for pick-up ship. On a live mission they would help astronaut at this point.

Welcome refreshment on deck of pick-up vessel. Men may lose up to 10 pounds of body weight on operation of this type.



"The Air Force Takes Care of Its Own"

NEW MEANING FOR AN OLD SLOGAN

IT WAS 1952 when Eighth Air Force spearheaded a pilot "Family Services" program to give SACmen deployed overseas "peace of mind" by insuring that someone would assist their families in an emergency.

Since then the volunteer help program run by Air Force wives under USAF sponsorship has blossomed into a global effort to help solve problems peculiar to Air Force life and just plain everyday emergencies. Family Services (formerly called "Dependents Assistance") has become a part of Air Force life. Today nearly all bases in every major command have an active Family Services Program and Center.

An airman's wife is suddenly hospitalized. A dependent youngster at an overseas base falls on a pair of scissors which stick in his head. Hurricane Ethel roars up the Gulf of Mexico toward Mobile, Ala., and Brookley AFB families with small children seek protection from the storm. An Air Force captain, en route from assignment in the U. K. to a Texas base, is involved in a truck-strikes-car collision and loses all the family belongings.

Hardly a day goes by in which some airman or his wife doesn't call on Family Services for help. In every case the volunteers answer the cry for help, stand by if needed until relatives or friends arrive. They are ready to take over care of children and of the home; handle other details facing an Air Force family during an emergency.

On call every day of the year, Family Services volunteers frequently work overtime on weekdays, weekends, and holidays. How well "the Air Force takes care of its own" is reflected in these recent pictures of assistance rendered under the accelerated Family Services program. —DAVE KARTEN

Family Services volunteers and base commander welcome tot to Harlingen AFB after mishap to the family auto enroute to base.

Canadian officer arriving at Brookle AFB for tour with U. S. Air Force g

Mrs. Eugene C. Fletcher, former FS coordinator at Andrews AFB, Md., models the smart uniform worn with pride by women who show that *The Air Force takes care of its own.*

At Robins AFB, Ga., Family Services sponsors a class in citizenship for foreign-born wives of airmen who brought their brides from overseas areas.

Family Services volunteers frequently go into Air Force homes to help in time of emergency.

Brookl answers to his questions from a
orce g iendly Family Services volunteer.

Air Force family arriving at Wright-Patterson AFB checks out kitchenware from Family Services.

Sunshine and Shadow

The splendor and tragedy of bygone glory, the romantic pageant of the present, and the brightness of hope for the future are blended together in colorful Spain

by TSgt. JOHN K. O'DOHERTY, Airman Staff

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THERE ARE DOZENS of men in Air Force uniforms who still remember their first visit to Spain as a rough and rugged experience. But that was more than 15 years ago when World War II was approaching a climax in Europe. As the struggle veered northward from Africa to the Continent, Allied forces moved successively over the bloody stepping stones of Sicily, Anzio, and Salerno. More than 1,200 American airmen flying combat missions over the Mediterranean battlegrounds were forced to crash-land or parachute into Spain. Some were wounded before leaving their damaged aircraft over the coast; others tried hopefully to nurse the cripples in for a landing in open country. Either way it was no picnic.

Although Spain was officially neutral during the war, these men were not interned as might have been expected. Instead they were given refuge and help. Substantial numbers made their way out of the country to rejoin Allied units. Of those who successfully "walked out of Spain" many would not have made it but for the kindly people who bound up their wounds and gave them food and shelter.

Once again American airmen are landing in Spain, but this time the picture is different. The Air Force mission overseas is no less imperative than it was in 1943 and 1944, but the circumstances surrounding the individual are altered. While the military requirement for combat-readiness is as much in evidence here as anywhere, Spain, so far as the personal life of the individual is concerned, has become a strong contender for "best overseas assignment possible."

Within a short distance of his base, an airman may stroll on a plaza that was laid out by the Romans, or rest in the shadow of a building that was centuries old when the Pilgrims landed at Plymouth Rock. Young men living in the midst of one of the most glamorous and picturesque societies of the Old World are moved to examine their sense of values, and find a new perspective. Perhaps more important, Americans and their families are learning that culture and money are not inextricably associated. In Spain particularly, the art of gracious living can be cultivated on a budget.

The Military Picture

The presence of American forces in Spain dates back to 1953 when the governments of the two countries completed negotiations on a pact for mutual assistance. This agreement, signed by U. S. Ambassador James Clement Dunn and Spanish Minister of the Exterior Alberto Martin Artajo, provided—among other things—for construction of air bases and support installations for use by American forces, and creation of an air defense system to be used jointly by the forces of the host country and the United States.

The organization established to implement the program in coordination with the Spanish government—Joint United States Military Group (JUSMG)—set up operation in the building of the Spanish Air Ministry at Madrid. Construction was begun on the new bases

in 1954, and JUSMG continues to function as liaison agent with the Spanish authorities.

The complex of bases used by U. S. forces begins at Rota on the southwest coast near the ancient city of Cadiz. Here is the site of Rota Naval Base operated by U. S. Naval Activities, Rota. Carrier-based aircraft can be landed for maintenance, and major repairs can be made on the big ships stationed in the Mediterranean.

Rota plays an important role in support of Air Force activities as the starting point for a POL pipeline which runs northeastward for 485 miles through the very heart of Spain. It is generally along this pipeline that the major Air Force installations are located. The pipeline, 12 inches in diameter at Rota and fed by 70 underground storage tanks, can feed POL products to the bases around the clock.

First stop on the pipeline run, north from Rota, is Moron Air Base, located 37 miles southeast of Sevilla and nine miles northwest of the town of Moron de la Frontera. Next is San Pablo, a support facility situated at the Sevilla Municipal Airport just seven miles from the city.

Still following the pipeline to the north the next major installation is Torrejon Air Base 15 miles northeast of Madrid, capital of Spain since 1561. Torrejon is the largest base in the complex and houses command headquarters for all Air Force operations in the area. Its runway measuring 13,400 feet is the longest in Europe, and the area of the main base covers 3,250 acres.

Terminal point of the pipeline lies 200 miles northeast of Madrid at Zaragoza Air Base nine miles west of the city, sometimes spelled Saragossa.

These four major bases in Spain—Zaragoza, Torrejon, San Pablo, and Moron—are assigned to Sixteenth Air Force, a major component of SAC with headquarters at Torrejon. The SAC operational units assigned are full-time partners in Reflex operations.

Torrejon Air Base is also the home of Headquarters 65th Air Division, a subordinate command of United States Air Forces, Europe (USAFE). The 65th AD is responsible for operation of the U. S. portion of area air defense conducted in conjunction with Spanish air forces. Fighter-interceptor squadrons of the 65th are

deployed at the SAC bases at Zaragoza, Torrejon, and Moron. Jet interceptors of the Spanish Air Force fly air defense missions from the same bases.

In addition, there is a network of AC&W radar sites stretching across Spain to the border of France, as well as a microwave radio communications system linking the air defense framework. These air defense sites are operated jointly by USAF teams working side by side with members of the Spanish air force.

Spain is a member of the United Nations, but is not included in the 15-nation NATO alliance. The Spanish government, however, has followed a policy of strong opposition to communism dating back prior to the emergence of Cold War between East and West. In recent years particularly, Spanish attitudes have tended to become more closely orientated with the ideals and aspirations of the western countries.

Since the bases in Spain are new, all the usual personnel facilities such as clubs, schools, commissaries, and exchanges are completely up to date. Construction programs for family housing have moved along in orderly fashion, and substantial numbers of new units are now occupied. On-base government housing, however, is very limited, being barely sufficient for key personnel. The larger housing areas are located off-base in the local communities, 20 miles distant in the case of Torrejon and 30 miles at Moron. Community centers, including housing, commissary, exchange, medical clinic, and school are in existence or programmed for some of the air defense installations. Many Air Force families rent homes from private landlords, encountering, incidentally, leasing and rental arrangements quite different from those in the United States. In any event, Air Force families in Spain live in close contact with the local people.

The Rains in Spain

Spain occupies the largest portion of the Iberian Peninsula, a roughly square-shaped mass of land jutting out from the southwest corner of the European mainland. The peninsula is about twice the size of Nevada, and it was from the port of Palos in the southwest corner that Columbus sailed on his epic voyage of discovery in August 1492.

Except for the proximity of Portugal, comprised of a narrow coastal strip on the west, and the tiny Republic of Andorra in the northeast corner, Spain is isolated from its neighbors. The country is separated from France by the Pyrenees, a rugged, precipitous, snow-capped range of mountains rising to more than 10,000 feet. So formidable a barrier is this natural frontier that an old French proverb holds that Europe ends at the Pyrenees and Africa begins.

To the passenger arriving in Spain by air, the allusion to Africa becomes understandable. From above, the country has the appearance of an arid, treeless expanse, crisscrossed by mountains and only sparsely marked by rivers and lakes. Spain is, in fact, the most mountainous country in Europe with the exception of Switzerland. And—just as in Switzerland—the topography of the country has had a considerable influence on political, economic, and sociological evolution. With the rise of industrialism in Europe, as example, Spain might have become the crossroads for commerce with Africa —only 12 miles off the southern coast—had it not been for the barrier of the Pyrenees.

More than half of Spain is comprised of a central tableland, the *Meseta Central,* rising to a height of more than 2,000 feet. It is punctuated by jagged mountains which shut out the moisture-bearing winds from the ocean. Thus the *Meseta* is dry, almost treeless, and very thinly populated. Altogether with its 28 million people Spain is as sparsely populated as Ireland. But the soil of the flat highlands, although unsuitable for farming, produces provender for sheep which roam the countryside in flocks of thousands with their shepherds. Spain has more sheep and goats than the United States, and it is not unusual to see a street in Madrid blocked by the passage of the woolly animals.

The high sierras which block the rain from the central plateau catch and store great quantities of snow during winter months. In spring and early summer the melting snows cascade down through the valleys irrigating the land between the mountains and the seacoast. As a result, population centers as well as industrial activities

Gay potted plants, wrought iron, and narrow winding streets describe the *Barrio de Santa Cruz,* an inviting district of old Seville.

Photo: Spanish National Tourist Office

and agriculture are concentrated on narrow coastal strips between the mountains and the sea.

The La Mancha valley, famed as the setting for the adventures of Don Quixote, is the greatest olive-growing area in the world. The Valencia delta and the area around Valencia are especially well blessed. Spain is renowned for production of olives, wine grapes, oranges, cork trees, and other semitropical crops.

As the pressure of nature largely determined where the Spaniard would live and work, so also the rugged terrain has had its effect on the national character. In earlier times travel between communities or from one region to another was exceedingly difficult. Recently, in fact, it has been said that a Spanish railroad must travel two miles up, down, and around something in order to cover one mile as the crow flies. Traditionally, for this reason there was little communication between different parts of the country, and the sense of intense sectionalism endures to the present time. The resident of Galicia will be quick to point out that he is a Gallego, and the citizen of Barcelona is proud to be a Catalan from the region known as Catalonia. The differences in customs, costumes, and attitudes add spice to the colorful pageant of the Spanish provinces.

The Grandeur of the Past

The oldest inhabitants of the Iberian Peninsula are the Basques who occupy the northern provinces bordering on the Bay of Biscay. Here in the rainiest part of Spain the climate is so mild that roses bloom through winter months. The region is rich in iron and coal, and farmers grow grapes for wine and apples for cider. Whales have disappeared from the fishing grounds but vast quantities of sardines are harvested from the *rias* or narrow inlets along the coast. The Basques are a mysterious people. They are a distinct ethnic group and their origin, say some scholars, can be traced back to the Stone Age. Their ancient distinctive language bears no resemblance to any other in the world, and they continue to retain their identity after centuries of turbulent history.

The Phoenicians, a great nation of traders, arrived in Spain about 1100 B.C. They established a lively center of commerce around Cadiz, formerly called Gadir and said to be the oldest town of continuous existence in Europe. The Phoenicians are credited with introducing the olive to Spain as a crop suited to the soil and climate.

Then the Greeks came in 600 B.C. followed by the Carthaginians in 535 B.C. A tribe of Celts, probably from the British Isles, settled in Galicia about 200 years later, and their merger with the existing population produced a people known as the Celtiberians.

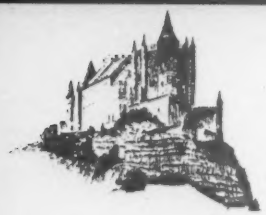
The Romans appeared on the scene in 206 B.C. and conquered practically the entire peninsula. They introduced Roman law, architecture, and the Latin language from which Castilian Spanish is descended. The Romans dominated the country for 600 years and during this time most of the great cities were established. Spain under the Romans grew to nearly three times the population it supports today. Two Roman emperors, Trajan and Hadrian, were born in Spain, and the colony contributed all the greater authors to the "silver age" of Latin literature. The old city of Salduba was renamed by the Romans in honor of the Emperor Caesar Augustus, and "Caesar Augustus," slurred over the centuries, comes down to the present day as Zaragoza.

With the decline of Roman power, about the 5th century A.D., the Vandals and Visigoths from the north moved in to dominate the scene for about 300 years. The colorful region of Andalusia, a favorite area for visitors, was once known as Vandalusia.

In 711 A.D. the Arabs, assisted by the Berbers and the Syrians, came to Spain under the banner of Mohammed. The followers of the Prophet conquered all but a few communities in the north and built a dazzling society that was destined to endure until 1492. The magnificent Arab—or Moorish—culture spread its influence over all of western Europe. Toledo, Cordova, and Sevilla became centers of learning. The arts flourished and commerce thrived. Cordovan leather became world renowned, and Toledo became the rival of Damascus for the production of superlative metals. It was said that the blade of a Toledo sword could be bent in an arc, point-to-hilt, and the edge could sever a hair floating on the surface of water.

With all their genius for the arts, science, and industry, the Moors lacked the capacity for strong political control. Over the years a number of small independent kingdoms sprang up on the fringes of the Moorish state. A series of small wars compressed their area of domination until for the last two hundred years of their stay, Moorish power was concentrated around Granada. The kingdoms of Spain became unified under the monarchs Ferdinand and Isabella, and the Moors were driven from their last stronghold in 1492. The extent of Moorish contributions to European art, science, architecture, medicine, and learning is well-nigh incalculable.

The house cut into the hillside is naturally air-conditioned. The thick rock walls keep the interior cool in the heat of summer and block out the chilling bite of winter wind.



Spanish Gold and Glory

Following discovery of America in 1492, Spaniards set about building a great empire, and Spain ascended to the pinnacle of its glory. When Charles V ruled over Spain in the 16th century he reigned also over Germany, the Netherlands, Naples, Sicily, and the overseas empire. Spanish possessions upon which "the sun never set" extended to the Indies, the Americas, and across the Pacific to the Philippines. The conquistadores marched over the mountains and through the jungles of the New World as fat galleons plowed homeward through the seas heavy laden with treasure.

Following the death of Charles V, Spanish power declined rapidly. Philip II launched the ill-fated Armada against Britain. A long series of wars with England and France speeded and intensified the process of erosion. One by one the colonies fell away, and the 19th century saw complete dissolution of the New World Empire. Florida was lost in 1819, Mexico in 1821, and California in 1822.

The spirit of independence emanating from the French and American Revolutions inspired the colonies of South America to seek their freedom. By the time of the Spanish-American War in 1898 everything was gone except Cuba, Puerto Rico, and the Philippines. These areas were severed from Spain by the Treaty of Paris, December 10, 1898.

Sic Transit Gloria

Following the loss of empire, the decline of Spain continued unabated. During the years when Spaniards were harvesting the fabulous treasures of the Indies and the Spanish Main, development at home was neglected. As Spain advanced into the 20th century the country was far behind the rest of Europe in the march of progress. Few of the reforms which had changed the way of life in other lands over the centuries had been adopted. Spain faced problems which other countries had solved decades or even centuries earlier. The social system was still steeped in feudalism; industry and agriculture were out of step with the times. The principal products offered to the markets of the world were luxury items such as fine wines and fancy fruits. This tended to make the economy extremely vulnerable to the fluctuations of international commerce. The country was severely wracked by the depression following World War I, and again in the depression beginning in 1929.

Another milestone in the turbulent history of Spain was passed in 1931 when Alfonso XIII, last of the Spanish kings, vacated his throne and went into exile.

Spain in Transition

The story of Spain is long, full of conquests, intrigue, great heroes, tragedy, invasion, victory, and defeat. Each member of the cavalcade marching in turn across the violent pages of history has left an impact on the land and on the people. The grandeur of Rome, the splendor of the Moors, and the glory of Empire, each have their monuments in the watchtowers, the walled cities, the palaces and castles that are seen all over the country.

Modern Spain has progressed to a considerable degree in overcoming the economic shortcomings of some years ago. The factories of Bilbao and the business houses of Barcelona hum with gratifying activity. But in spite of a relative prosperity, the country, withal, retains the easy-going atmosphere of a more leisurely age.

It has been said that, in Spain, the calendar is of more importance than the clock. This is the attitude of *manana,* "what needs to be done today can just as well wait till tomorrow." The people are frugal and hard-working, but uninhibited by pressures. If visiting Americans are inclined to be impatient with such a dis-urgent philosophy, it might be well to reflect on the absence of ulcers and tranquilizers.

The average Spaniard is described as warm, emotional, and impulsive. He is known for outstanding graciousness and courtesy. *Simpatico,* a word for which there is no exact English equivalent, fits the national personality accurately. The Spaniard feels superior to foreigners. This is not a personal attitude, but rather a national characteristic. Whatever his feelings in general may be, they are never permitted to influence his attitude toward individuals. Politeness and consideration are a part of his nature as much as the musical tones of the language.

On the other hand, Spaniards find it difficult to forgive a slight or an insult. And being emotional, they are likely to be explosive in expressing either anger or joy. They do not come in like the tide. They blow up like a volcano. But slyness or hypocrisy have no place in the Spanish character.

Social and business life in Spanish cities moves along at a sedate pace. Stores and offices close—practically all movement ceases—for the lunch period, usually from two in the afternoon until four. Any attempt to do business between these hours is useless, and it is virtually impossible even to find a taxi on the streets.

The dinner hour in the evening begins about ten for the early birds, and later for the majority. Night clubs open at ten and close about three when, presumably, the citizens begin to think about bedtime. Since the advent of the Americans, some business establishments in the neighborhood of the bases are making concessions to American habits. Some night clubs offer "matinee" sessions from six to nine in the evenings, and restaurants will serve *cena,* or dinner, at a relatively early hour.

Really first-class dining rooms in Spain rarely feature music of any kind. Spaniards believe that food is at its best when conversation flows freely but, naturally, not loud enough to disturb others nearby. At the *tascas,* or bar restaurants, a less formal atmosphere prevails as

the customers enjoy *mariscos* and a glass of wine or good Spanish beer.

Americans patronizing Spanish restaurants quickly learn to ask for the check, *"la cuenta por favor,"* well in advance. Otherwise they may find themselves late for wherever they are supposed to be next. This universal delay in presenting the bill in Spanish restaurants is not due either to carelessness or inefficiency. It is rather a gracious gesture indicating that the establishment is honored by the presence of the guest and his departure should be delayed as long as possible.

In discussing social customs it may be well to warn Americans against the custom of kissing a lady's hand until they are sure of their ground. A Spanish gentleman will kiss the hand of a lady to whom he is introduced or when he meets a lady he knows. However, this gracious gesture is reserved for married women, and is never conferred on single girls.

Madrid, even more so than Paris, is famed for the number and gaiety of its sidewalk cafes. In the spring, as soon as the weather permits, tables by the thousands are placed outdoors under shady trees. Here the customers sit, sip, nibble, and watch the passing parade. Madrid has been nicknamed by Spaniards "El Cielo," meaning Heaven, because of the beauty of its women. Because of its importance as a cultural center, personable young women from all over Spain flock to the capital in search of a career, just as aspiring young French women congregate on Paris.

Of the many attractions offered by Madrid, American visitors are particularly interested in the *Plaza de Toros,* or bullfighting stadium. This imposing edifice, with seating accommodations for 25,000 spectators, is frequently packed to the rafters during the season as Madrilenos flock to see their favorite matadors perform.

Bullfighting is the national sport of Spain, and is a survival of the Roman circuses during which gladiators fought against wild beasts in the arena. The bullfighting season runs from April to October with performances usually held on Sundays, Thursdays, and fiesta days. The contest is no longer simply a fight between man and beast, but rather an exhibition of skill, courage, horsemanship, and gracefulness on the part of the human participants. The fans, or *aficionados,* are more critical of the finer points of the sport than are Americans with respect to baseball.

The biggest week of the year in Madrid is the second week in May when the city celebrates the Feast of St. Isidro its patron saint. During this period, also known as the Week of the Bullfights, the city assumes a carnival atmosphere, with processions in the streets, band concerts, and a variety of other events.

Fiestas are a part of life in Spain, and in these colorful celebrations the exuberance, poetry, and romanticism of the Spanish personality find their most eloquent expression. More than 90 percent of all Spaniards are Catholics (the Reformation failed to cross the barrier of the Pyrenees), and the fiestas frequently have a religious association. Some fiestas do honor to patron saints, while others change their dates from year to year in accordance with the moveable feasts of the church.

During Holy Week solemn street processions are held all over the country and the gaiety of the fiestas begins in the weeks following Easter, when Lent, the period of restraint and particular religious devotion, is over. Granada, Montserrat, Malaga, Toledo, and other cities all have their fiestas following Easter, not to men-

Colorful gypsy families can be seen in southern Spain. Many are skilled artisans, noted for their work with metals as well as for the olden art of basket weaving.

tion Murcia with its colorful and traditional *Bando de la Huerta,* the Burial of the Sardine.

The most colorful celebration held in any part of Spain is *La Feria de Sevilla,* the Seville Fair, which lasts for eight days beginning on the Saturday after Easter. Business comes to a virtual standstill as the city gives itself over to the fiesta. Bull fights are held every day. The staccato stamp of flamenco dancing, singing voices, and the music of guitars by the dozen fill the air from morning till night. Everyone who has a single drop of Andalusian blood feels an urge to assist in the *Feria,* while barrels of Sherry contribute to the conviviality. (The name Sherry comes from the town of Jerez de la Frontera south of Sevilla.) The typical flat-top hats and high heels worn by Spanish gentlemen are especially noticeable in Sevilla, as well as the brightly colored dresses with many petticoats favored by the belles of Andalusia.

Altogether the region of Andalusia is the most colorful and romantic area of all Spain. Horse carriages with their gracefully curved shafts and folding "convertible" tops are still common even on the streets of Cadiz. Young men on horseback sit straight and stiff in the saddle while their ladies ride side-saddle behind in perfect dignity.

It is especially in Andalusia that one will see young ladies sitting along the road in front of their houses doing needlework—but with their backs to the road. This is supposed to indicate that they are concentrating on their stitches and do not wish to be distracted by the flirtatious attention of male passersby. Behind this custom, it seems, there is hidden a sort of romantic reverse psychology.

Along the coast of Andalusia the houses are whitewashed, tile-roofed, and equipped with balconies from which clothes are hung to dry. The population of pigeons overhead and chickens underfoot seems to outnumber the people. Each house has a small cupola called the "Widow's Tower" from which wives in earlier days watched for the return of seafaring husbands.

Further in from the coast some of the houses are built of light-colored sandstone which darkens with age to a rich and deeper tone. Buildings are decorated with grilled balconies providing a fine background for geraniums, fuchsias, and oleander which grow in profusion.

Bands of gypsies are found all over Spain, especially in the south. The largest gypsy colony in the world lies just outside the city of Granada, last stronghold of the Moors. It is said that the word "gypsy" comes from "Egypt," and the present-day gypsies are supposed by some to be descendants of North Africans who managed to remain after the defeat of the Moors in 1492. Others say they came from India and wandered into Spain about 500 years ago. Still another legend of the gypsies is that they are a race condemned to roam forever over the earth because they forged the nails that crucified Christ.

In any event, these strange gypsies of Granada live in caves in the Sacro Monte quarter—caves carved out of the soft limestone hills dominating the city. Residence in the caves is not necessarily a mark of poverty, as might be supposed. Many of them are very comfortable with electric lights and running water. The walls are whitewashed and the stone floors are dry and clean. The rock walls provide natural insulation against summer's heat and winter's chills.

The *gitanos* of Granada's caverns have produced many of Spain's finest singers and dancers, and are responsible for much of the music and color that are so typically Spanish. Many of them make a living by performing for visitors who climb the steep winding paths to the gypsy caves.

For an audience of neighbors or visitors the *gitano* girl with her long flounced skirt and spit curls will dance a *zambra* in the main cavern of her home. Her fingers snap like pistol shots; her heels stamp a fusillade on the hard floor, and her body twists like a reed in a storm. The insistent strumming of accompanying guitars and the clapping hands of her audience urge her on to

The pattern of sunshine and shadow has decorated the streets of old Segovia for centuries. Romans built this aqueduct.

greater frenzy, while her mother passes the Sherry bottle. All mothers are nicknamed "La Faraona," meaning Pharaoh's Daughter, and reflecting further the notion that the gypsies were originally Egyptian. The gypsy men are industrious workers, highly skilled in artistic fashioning of products in brass and copper.

Transition from Past to Future

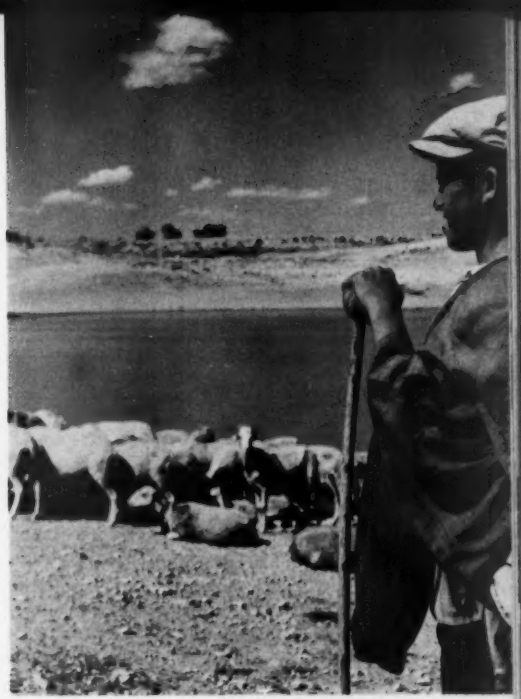
No visitor can remain long in Spain without hearing mention of the Civil War. The generation that fought this tragic contest is now middle-aged or older. References to the war are frequently indirect, often casual, and—after all these years—almost wholly without evidence of bitterness. Altogether the Spanish Civil War is a delicate and complicated subject—a subject imbued with a depth of feeling beyond the comprehension of those who know it only from the inanimate pages of history. It is not a topic recommended for casual, superficial discussion by visitors. Old wounds are largely healed, but scar tissue can remain tender for a long time.

Two attempts have been made to establish a republican form of government in Spain. The first occurred in 1873 and ended in 1875 with the restoration of the Bourbon monarchy. The second effort was made in 1931 and ended with the explosion of the Spanish Civil War in the summer of 1936. The basic reason for failure in both cases was the fact—so vividly demonstrated on numerous instances since—that democratic institutions simply cannot be imposed bodily on a social organism that has not attained the necessary degree of development.

In the municipal elections of 1931 Republican parties won an overwhelming victory. King Alfonso XIII left the country and a provisional republican government was established under President Niceto Alcala-Zamora. But the world at that time was sunk in the throes of the great depression and the young republic was faced with a series of insoluble problems.

The most formidable of these problems concerned the farmers since the agricultural system remained largely unchanged from the feudal system of the Middle Ages. Although three fourths of the population depended on farming for their livelihood, the land was for the most part owned by the gentry. It was estimated that two percent of the landowners held 67 percent of the land. Of those farms owned by the occupants, thousands covered less than one acre. Farmers who rented their holdings from feudal estate-owners had no incentive to improve, since improvement meant only higher rents. In addition, three million landless workers tilled the soil for others, whenever it was possible to obtain a day's work.

In the industrial north, raw materials such as copper, iron, and coal were plentiful, but there was no sale for manufactured goods. The poverty-stricken farmers could buy nothing, and there was no demand from depression-ridden markets abroad. Jobless farm hands flocked to the cities to compete with the industrial workers for wages, thus worsening the position of the city-dwellers.



On the outskirts of Madrid flocks of sheep and their shepherds still dot the landscape as they have for centuries.

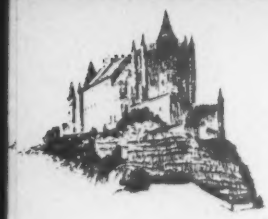
In addition to all this, when the republic was established, more than half the people could neither read nor write. The country, moreover, was not wholly united. In many provinces, notably in Catalonia, Galicia, and the Basque country of the north, there were strong movements for independence from the central government at Madrid.

Things progressed from bad to worse. In Madrid many workers turned to socialism; in Barcelona there was talk of anarchism and syndicalism. Practically every shade of political philosophy made its appearance in Spain in the years between 1931 and 1936.

In this atmosphere of crisis, strikes, riots, and outright attempts at rebellion erupted all over the country. The government became weaker, more quarrelsome and incompetent. In time it became infiltrated with individuals who looked to Moscow for advice and guidance. In the elections of February 1936, all the radical and left-wing elements united in a Popular Front to win the election. The climate of disorder became more intense and violence spread through the country like lightning. Civil War followed within a few weeks.

Unlike the American Civil War, there was no geographical line of demarcation. There was no North and no South; the war simply engulfed the entire country like a tidal wave. Fathers were pitted against sons, and brother against brother. Before it ended in victory for the Rebels, or Nationalists, in 1939, a million Spaniards had lost their lives.

This war has been described as a rehearsal for World War II. It was called by some a struggle between the forces of traditionalism and modernism. Others pointed



to it as the first ideological conflict of the century. Thousands of non-Spanish people took part on both sides—many Americans participated—in this international war fought on Spanish national soil. Apart from its impact on the future political future of Spain this complicated manifestation constituted a profound emotional experience for all who were touched by it.

When the war ended on April 1, 1939, General Francisco Franco Bahamonde, leader of the victorious Nationalist forces, assumed control of government. In his youth General Franco became the youngest lieutenant in the Spanish army after graduating from the Military Academy in the Alcazar at Toledo. In turn he rose to become the youngest captain, the youngest major, and the youngest colonel.

General Franco's title as head of the Spanish government is *Jefe de Estado,* meaning Chief of State. The form of government has been likened to the cabinet system by which the Executive Branch of the United States government operates. Unlike the American President, however, the Chief of State—also called the *Caudillo,* or leader—is not responsible to a legislature. Each Cabinet Minister is responsible to the Chief of State for performance of his particular function. The fundamental rights of the Spanish people are contained in a series of basic laws.

The serious student of socio-political evolution will find much to interest him in the Spanish Civil War, and the form of government which it established. Too much reliance, however, should not be placed on the conventional and convenient political labels that are tossed about in the shallower waters of political discussion. These labels are likely to have a new meaning when they cross the Pyrenees. Spaniards have a way of taking something with a foreign trademark and making something typically Spanish of it.

Relative prosperity during recent years and substantial gains against the handicap of illiteracy are rapidly dissipating many of Spain's earlier problems. Skylines of the cities are changing as new buildings arise to mark Spain's accession to stature in the European community of nations. As a partner in OEEC, the Organization for European Economic Cooperation, Spain is finding that the wall of the Pyrenees is no longer the painfully restrictive factor it once was.

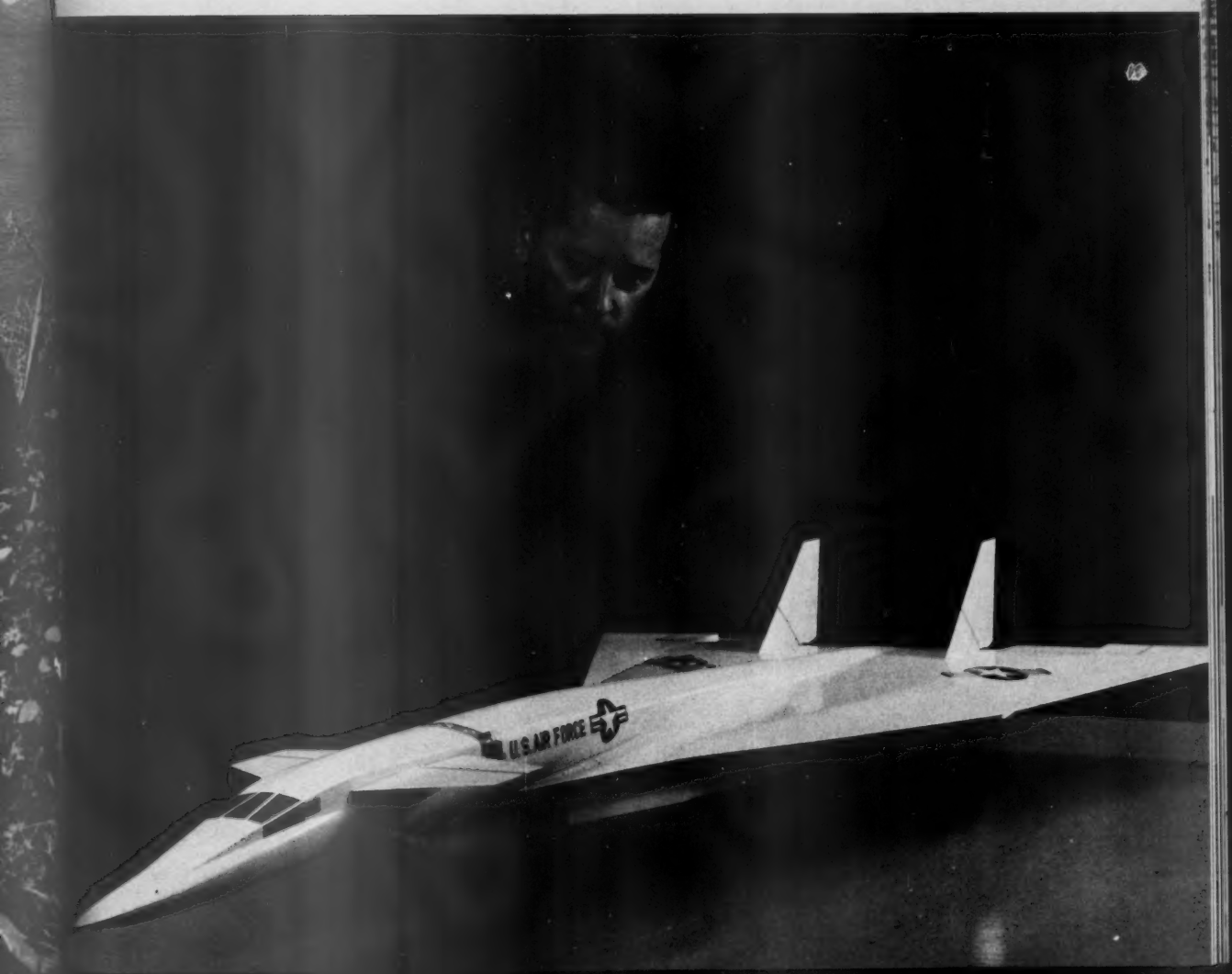
There are some features of modern industrialized society that will never find a place in Spain. The afternoon siesta will unquestionably endure as a national practice, and the juke box can never replace the spontaneous musical expression of Andalusia. The people of Spain love their country and have faith in its future. They are vigorously proud, too, of the colorful and romantic intangibles with which they have surrounded themselves. For which, the world may well echo, thank God.

Torremolinos' sunny beach, one of many fine resorts on Spanish Riviera coast.

Photo: Spanish National Tourist Office

AIRMAN'S WORLD

EX-USAFMAN, *test pilot Al White, contemplates a model of the B-70 he will be first to fly. Presently under construction by North American Aviation, Inc., the sleek* Valkyrie *is expected to make its initial hop some time late in 1962. (See,* B-70, On Course, On Target, *April '61.) Of White's 11 years in Air Force blue, two were spent in WW II combat in the ETO where he engaged in six major campaigns. (For details on the Mach 3 bomber, see* The Valkyrie, *June '60.)*



OPERATION FLOOD TIDE *spells Anglo-American cooperation. The project is an extensive USAF-RAF joint refueling test designed to establish the compatibility of equipment of the two air arms, and to determine the capability of tanker-receiver combinations using this equipment. USAF's 47th Bomb Wing supplied KB-50s and B-66s while the RAF utilized Valiant* Tankers *and* Receivers, Vulcans, Victors, *and* Javelins. *In early tests, airborne trials proved successful and more than 50,000 pounds of fuel were transferred in 76 contacts. Subsequent phases are still being conducted over England.*

USAF Honors the Army

Two U. S. Army members are currently enjoying the unique distinction of being the sole non-Air Force holders of the newly designed Airman's Medal.

WO Earl R. Slattery and MSgt. Edwin H. Eaton received the medals for the role they played in locating and evacuating victims of an air disaster.

The Air Force C-47 crashed nearly 16,000 feet up the side of Mt. Pichincha, Ecuador, in June 1960. The two soldiers volunteered to lead rescue units into the remote area on a mission which turned into a four-day ordeal before it was determined there were no survivors.

Both Mr. Slattery and Sergeant Eaton are assigned to the U. S. Mission to Ecuador. The awards were made during a special review at Albrook AFB, Canal Zone.

Routine Global Chore

Aircraft and crews of TAC's 839th Air Division recently returned to Sewart AFB, Tenn., following participation in *Operation Long Pass,* a week-long Air Force-Army training exercise conducted in the Philippine Islands.

The C-130 *Hercules* aircraft were flown over a 10,000-mile route to Clark AB, completing the jaunt in about 30 hours. However, such feats have become no more than routine tasks for Brig. Gen. Frederick J. Sutterlin's division. The organization now has a record of having engaged in operations in such widely scattered areas as the Arctic and Antarctic, Panama, and Europe.

Double-duty Ambassadors

Pilots of the 112th Tactical Fighter Squadron, Toledo's Ohio Air National Guard unit, are currently fulfilling roles which call for dual loyalties.

First in their hearts is loyalty to the nation—aptly demonstrated by their membership in the National Guard program. But, just so they won't forget their loyalty to their community, all 29 pilots recently joined the Toledo area Chamber of Commerce en masse.

Their aim, the pilots say, is to help promote the Toledo area, but they also hope their action will emphasize the fine military-civilian relationship that exists there.

Maj. Milan R. Forkapa, Jr., the 112th's commander and winner of the Rick's Memorial Trophy last year, indicated he felt this close tie might serve as an example to other communities which host similar organizations.

Foreign Language Openings

USAF has announced there will be a limited number of openings in foreign language training for officers during Fiscal Year 1962.

Officers who desire to apply must fall within specified categories. They must be regulars or career reservists on extended active duty. They must have less than 16 years active Federal military service and be serving in specified grades. Additionally, they must currently be serving at a stateside station, be eligible for foreign service, and be citizens of the United States.

Principal need exists in two areas —Air Intelligence Service and the Directorate of Special Investigations.

Officers in the grades lieutenant through captain may apply for training in the former. Languages include German, Russian, Greek, and French.

Only company grade officers may apply for OSI language assignments. Needs here cover a wider lingual span, however, with openings for specialists in Korean, Tagalog, both the Fukenese and Mandarin dialects of Chinese, Turkish, Japanese, French, German, Greek, classical Arabic, and Spanish.

Application details are contained in AFM 35-11.

Bits of Blue

. . . USAF has received funds of more than $2 million to be applied to the rehabilitation of the Wherry Housing projects at Davis-Monthan and Williams AFBs, Ariz.

. . . SAC's 93rd Bomb Squadron will move from their present station at Homestead AFB, Fla., to Kincheloe AFB, Mich., beginning about mid-August.

. . . During the same month, two SAGE units will also switch locations—Headquarters, 32d Air Division and the 4632d Support Squadron will move from Dobbins AFB, Ga., to Oklahoma City AFS, Okla.

. . . Two new research contracts, totaling more than $100,000, have been awarded to the Boeing Airplane Co. One calls for research on inorganic structural adhesives for high-temperature metals; the second, for a test device for evaluation of integral fuel-tank sealants.

. . . Construction is underway on the multi-million-dollar hospital at Sheppard AFB, Tex. Ground-breaking ceremonies were held in late February.

. . . Almost simultaneously, officials in the Office of the Surgeon General announced that the hospital at Beale AFB, Calif., had been completed and opened for operation. Formal dedication ceremonies are scheduled to be held this month in conjunction with National Hospital Week.

. . . American Car and Foundry recently rolled out the first of many modified railroad cars for the mobile *Minuteman* missile program. They will serve as launching pads for USAF's nuclear-tipped weapon.

. . . ARDC officials announced completion of tests on a one-piece radiation-resistant suit designed to protect ADC technicians working in highly concentrated fields of radio frequency and microwave radiation.

. . . Goodyear technicians have modified a B-57 bomber to serve as a "substitute missile." Fitted with an ATRAN guidance system, the plane will simulate all *Mace* maneuvers as an aid in keeping launch crews proficient.

. . . North American Aviation has developed a unique electric motor which can operate in temperatures high enough to "melt the tires off an automobile." It will serve as a unit of the throttle-control system of the 2,000-m.p.h. B-70 bomber.

Select Missile Crews

Borrowing a page from SAC's book, USAF's 38th Tactical Missile Wing recently conferred the title of "select missile crew" on members of their 585th Tactical Missile Launch unit.

Based at Bitburg AB, Germany, the honored crew is a member of the 71st Tactical Missile Squadron, USAF's first operational organization. Each member of the winning crew was presented a special missileman's badge which sports a red background in place of the normal blue. Should the crew continue to retain this designation during a 90-day period, each member will receive an outstanding performance report which should materially advance his promotion chances.

The competitive status was introduced by the parent wing, based at Sembach AB, Germany, as a means of providing added incentive for their widely scattered subordinate units to maintain an even higher degree of readiness than they are currently demonstrating.

AN INSIGNIA *from one of the 26 aircraft destroyed by Capt. Eddie Rickenbacker during WW I has joined the multitude of exhibits at the Air Force Museum, Wright-Patterson AFB, Ohio. Believed to be the only such item from any of Captain Eddie's victories, the panel was donated by Mr. L. A. Barr of Chicago, Ill. Maj. Robert L. Bryant, Jr., Museum Director, has added the priceless relic to the Rickenbacker section of the Museum's Hall of Fame.*

MAJ. ROBERT WHITE *(center), USAF's key man in the X-15 program, looks on as Scott Crossfield, North American test pilot, passes the rocket aircraft's symbolic keys to NASA's Neil Armstrong. The ceremonies marked the recent transfer of the speedy "spaceship" from contractor to customer. At the same time, it was announced that one of the needle-nosed research planes had been equipped with a 57,000-pound-thrust XLR-99 engine, designed to carry the aircraft and its two new pilots to 4,000 m.p.h. and 50 miles above the earth. X-15 No. 2, shown on the right, is currently being refitted to correspond in every detail with its predecessor.*

Jesse Rides Again

Officials at the Base Finance Office, Otis AFB. Mass., received a rude jolt recently when they were told Jesse James was coming.

No panic ensued, however. The occasion was merely the reenlistment of TSgt. Jesse H. James, namesake of the legendary badman who roamed the midwest nearly a century ago. A member of the 551st Organizational Maintenance Squadron, the current Jesse visited finance to pick up his reenlistment bonus money. A native of West Virginia, he has completed more than 16 years as a member of USAF.

Proficiency Testing

Phase 2-Cycle 2 proficiency testing is scheduled to begin on May 1 in overseas areas and a week later at stateside bases for members of the Regular establishment. Similar testing will continue throughout the month for Air National Guard and Air Reserve members.

Affected career fields include Nuclear Weapons (33), Wire Maintenance (36), Aircraft and Missile Accessory Maintenance (42), Aircraft and Missile Maintenance (43), Supply (64), Printing (71), Medical (90), and Dental (98).

Also included in this phase are the quarterly USAF Supervisory Examinations for personnel seeking to qualify for supergrade promotions.

Foundation Awards

An Air Force base newspaper, *The Altus Word,* Altus AFB, Okla., has been selected from among more than 150 service publications for a special award from the American Heritage Foundation.

Presented every four years, the honor signifies excellence in the field of the promotion of voting among members of the Armed Forces.

More than 70 Air Force newspapers were entered in the competition. Each was judged according to its method of production and voting promotion. Three other USAF publications were judged best in their class—The *Sheppard Senator,* Sheppard AFB, Tex., letterpress; *Lowry Airman,* Lowry AFB, Colo., photo offset; and *Croughton Communicator,* 7500th Air Base Group, USAFE, multilith.

MY TAIL IS COLD *might tell the tale of these F-105* Thunderchiefs *as they nestle their noses in winter wigwams along the Republic Aviation Corp. production line. The heated shelters allow engineers to check out electric systems in the 1,400-m.p.h. fighters prior to their delivery to USAF without holding up interior operations. Already operational with U.S.-based units, the 36th Fighter-Day Wing, Bitburg AB, Germany, will begin introducing them into Europe this summer.*

You Ask It

I will soon be discharged from the Air Force. None of my service has been during wartime. As a peacetime veteran, am I eligible for VA hospitalization?

If you are being discharged under other than dishonorable conditions for a disability incurred in line of duty or if you are receiving compensation for a service-connected or aggravated disability or disease, you will be eligible. Otherwise, the answer is no.

At the end of the Korean conflict I received an honorable discharge. Subsequently, I reentered the service and was given a dishonorable. Will this affect my VA hospitalization benefits?

No. However, it does affect your eligibility for burial in a national cemetery.

My WW II GI insurance policy, which I converted to an endowment plan, matures soon. May I choose to receive the proceeds in monthly payments till death?

No. You may select one of two plans. You may receive it in a lump sum, or select monthly payments ranging from 36 to 240 monthly installments. In the event you choose the latter, payments will be made annually in multiples of 12.

I will retire next month. If I am to remain eligible for VA benefits, must I keep them informed of any future change of address?

No veteran is required to get in touch with VA. However, it is always wise to contact local officials to determine your eligibility for benefits in the event you should desire to make use of these at some future date.

I am considering the possibility of residence in Alaska upon retirement. Does the VA have offices and hospitals there?

There are VA offices in both Alaska and Hawaii; however, neither state has a VA hospital. At present, veterans are being cared for through contract facilities in private hospitals in both these new states.

I know a wife may be buried in a national cemetery if her veteran husband is already buried there. Is she still eligible if she dies first?

If the husband assures cemetery officials that he also intends to be buried there, arrangements may be made for his wife.

I am a Korean veteran and would like to apply for vocational rehabilitation training. Must I undergo counseling before I can begin such training?

Yes. The law requires that counseling be administered to determine the need for training designed to overcome your handicap and to aid officials in selecting a program best suited to your abilities.

Air Age Library

SPACE

Two Air Force authorities, James S. Hanrahan and David Bushnell, have combined their talents to produce *Space Biology* (Basic Books, $6.50). It details the programs designed to prepare man for space flight.

In the same general category is the revised edition of Arthur Clarke's *Interplanetary Flight* (Harper, $3.50), which explains ion rockets, the van Allen radiation belts and similar recent developments in this area.

Frederick I. Ordway III and Ronald C. Wakeford have collaborated on a comprehensive, illustrated encyclopedia of missiles and space titled *International Missile and Spacecraft Guide* (McGraw-Hill, $25.00).

FICTION

Beyond the Planet Earth (Pergamon Press, $3.75) is an English translation of Konstantin Tsiolkovsky's science-fiction classic. The author is considered the father of Russian rocketry.

Connor H. Cole has authored a dramatic novel titled *The Cross and the Star* (Vantage Press, $4.95), the story of three chaplains—Protestant, Catholic and Hebrew—in Korea.

Combat in the Sky is the third volume of Arch Whitehouse's series of fiction-based-on-fact air-war stories. (Duell, Sloan and Pearce, $3.50.) The stories deal with combat in all our air wars.

HISTORY

The Wild Blue Yonder: The Story of American Airpower, compiled by John Loosbrock and Richard Skinner (Putnam, $5.95), is an anthology of the best from the 40-year files of *Air Force* magazine.

Doubleday recently released William Green's second volume of *Famous Bombers of the Second World War* ($3.95). The historical narrative covers design, production and the combat history of 13 Allied and enemy aircraft.

The history of the Atlantic Air Ferry is the subject of *I'll Take the High Road.* Authored by Sholto Watt and released by Brunswick Press, Canada ($4.95), it provides a fascinating study of the early '40s.

In *Ninety Seconds to Space: The Story of the X-15* (Doubleday, $4.50), Jules Bergman actually spans the entire period of our flight research program, from before the first X-1 flight through early experiments which involved the title plane.

Bruce Robertson has penned an excellent history in his *Spitfire: The Story of a Famous Fighter* (Harleyford Publications, $8.50) which relates the story of this well-known fighter from the drawing board to the last Mark XXIV model.

FIRE OVER KORIYAMA

***By April 1945 war in Europe was nearly over. Meanwhile, B-29 raids on Ja**per*

by SMSgt. Hal Bamford

ON JUNE 15, 1944, more than 50 B-29s struck at the Imperial Iron and Steel Works at Yawata, Japan, in the first *Superfort* raid on the enemy islands.

Simultaneously, some 1,700 air miles south of Tokyo, two Marine divisions swarmed ashore on Saipan in the Marianas.

The two events were closely coordinated and signaled the inauguration of a new phase of aerial warfare against the Japanese homeland—very heavy bombardment from relatively nearby air bases.

To a young private first class, half a world away in Dalhart, Tex., however, they were little more than two new entries in the daily parade of war headlines. But before another year had passed, the chain reaction triggered by the two incidents would profoundly affect the life of Henry Eugene Erwin.

"Red" Erwin entered the Enlisted Reserve Corps as a private on July 27, 1942, a scant two months past his 21st birthday. For the next six months, he waited anxiously at his home in the suburbs of Birmingham, Ala. Finally on February 3, 1943, he was called to active duty as an aviation cadet. His new career, though destined to be spotted by personal disappointment and disaster, was also to be climaxed by the presentation of this nation's highest military award, the Medal of Honor.

Henry Erwin reported first to the Classification Center at Nashville, Tenn., and from there was transferred to the Preflight Training School at Maxwell AFB, Ala. Successful in this phase of his training, in May 1943 he moved on to the 57th Training Detachment at Ocala, Fla.

Before another month had passed, however, the first disappointment struck and it appeared that Cadet Erwin's flying career had come to an abrupt end. On June 2, 1943, Henry Erwin was eliminated from further pilot training and transferred to the 602nd Training Group at St. Petersburg, Fla.

For 10 months Private Erwin shuttled through a series of technical schools, each leading him closer to his dream of flying. He began in Mississippi, moved to South Dakota, and finally graduated in April 1944 from the Radio Mechanic and Operator Course at Truax AFB, Wis.

He was assigned to the 52nd Bombardment Group —newly equipped with B-29s and in the initial stages of combat training. It was during these early training days that *Superfort* employment was explosively announced to the world and the invasion of Saipan became a reality.

In the weeks that followed June 15, 1944, the future of Pfc. Henry Erwin moved ever closer to its rendezvous with that Pacific fighting and the faraway Marianas.

Through the balance of 1944 the B-29s spread destruction over an ever-widening circle.

Earlier in the year, joint military planners had hoped to increase the bombardment of Japan by moving additional B-29 units to the newly constructed Marianas bases. They had in fact established tentative dates to

SGT. HENRY ERWIN

In the Name of Congress

No. 32 IN A SERIES

n Japer were being stepped up.

begin these operations. For example, it was hoped that the first B-29 wing in this area would be operational no later than October 5, 1944, and that others would follow within a few brief weeks.

Unfortunately, things did not work out this way. Determined enemy resistance in the Marianas wreaked havoc with schedules calling for the movement of the additional *Superfort* units. On Saipan this delay was negligible, but on Guam and Tinian it stretched well beyond the original target date. By October 22, just one week late, the first B-29s landed at Saipan's Isley Field. By mid-December a second strip became operational at this station.

Elsewhere, construction was not moving as smoothly. On Guam, plans at North Field were changed to accommodate the construction of four strips. However, the completion schedule for the original two was moved back two full months to early January 1945.

By December, units began to arrive at North Field. The next 30 days were spent establishing themselves and attaining full combat readiness.

By now, the balance of the air bases in the island chain began to shape up and additional units, long trained to a fine edge, headed toward the theater from widely scattered ZI bases.

Included was the 52nd Bomb Group, and with it Henry Erwin, now a sergeant assigned as a radio operator on one of 52nd's *Superforts*. The group had moved from Texas to Mather AFB, Calif., and on February 7, 1945, departed this west coast base to join sister units in the Asiatic-Pacific Theater. By the 25th of the month the group was in place and ready to strike its first blow in the expanding air war.

Between this last week in February and April 1, Erwin and his crew flew in 10 major strikes. Each member earned the Air Medal with one cluster, and Henry was promoted to staff sergeant.

Then on April 12, Sergeant Erwin's career reached its climax. His crew flew the lead aircraft for a major operation against the chemical works at Koriyama. The citation published June 6, 1945, vividly describes the several tense minutes near the high point of that mission when Sgt. Erwin earned the Medal of Honor.

He was the radio operator of a B-29 airplane leading a group formation to attack Koriyama, Japan. He was charged with the additional duty of dropping phosphoresce (sic) *smoke bombs to aid in assembling the group when the launching point was reached. Upon entering the assembled area, antiaircraft fire and enemy fighter opposition was encountered. Among the phosphoresce bombs launched by Sergeant Erwin, one proved faulty, exploding in the launching chute, and shot back into the interior of the aircraft striking him in the face. The burning phosphoresce obliterated his nose and completely blinded him. Smoke filled the plane, obscuring the vision of the pilot. Sergeant Erwin realized that the aircraft and crew would be lost if the burning bomb remained in the plane. Without regard for his own safety, he picked it up and, feeling his way, instinctively crawled around the gun turret and headed for the copilot's window. He found the navigator's table obstructing his passage. Grasping the burning bomb between his forearm and body, he unleashed the spring lock and raised the table. Struggling through the narrow passage he stumbled forward into the smoke-filled pilot's compartment. Groping with his burning hands, he located the window and threw the bomb out. Completely aflame, he fell back upon the floor. The smoke cleared and the pilot, at 300 feet, pulled the airplane out of its dive. Sergeant Erwin's gallantry and heroism above and beyond the call of duty saved the lives of his comrades.*

Other crew members made Sergeant Erwin as comfortable as possible as the giant bomber streaked for home. Upon arrival, the young hero was rushed to the hospital. Within weeks, he had been returned to the United States. In October, a grateful government directed his promotion to master sergeant.

For months, the best of medical attention was concentrated on the youngster. Finally on October 8, 1947, two and one half years after his gallant feat, MSgt. Henry E. Erwin was discharged from Valley Forge General Hospital, Pa., and returned to his home in Alabama where he currently resides near Birmingham.

Sergeant Erwin, recipient of USAF's 42nd Medal of Honor, holds the additional distinction of being the only enlisted airman to be so honored in the Pacific theater. He is also the last man in this branch of service to attain this award and survive the experience which led to the decoration.

a fighter pilot on the top of a LABS run or on an enemy's tail. You can never be a fighter pilot in a B-47.

Lieutenant, leave us alone here in our darkened stag bar, with our canes and our glasses and our memories. Don't fret about us, but if you ever need us, holler. Some of us can still stagger up the ladder, and we'll continue to do it for many years to come.

Capt. Frank G. Bell
Keesler AFB, Miss.

★ ★ ★

Medal of Honor

Sir: In your article *Air Support for Operation Madison* in the January issue, you detailed the exploits of Lt. William E. Metzger, Jr. I associate him with Ohio Wesleyan University in 1940 and 1941. Can you tell me if he attended that college during those years?

Lt. Col. R. E. Monroe
Beale AFB, Calif.

• *Sorry. The information available to us indicates nothing of his pre-service life other than the fact Lieutenant Metzger was from Lima, Ohio. Can anyone supply this information for Colonel Monroe?*

Sir: In your Medal of Honor article on General Castle (*Counter Counterattack*, February 1961), Sergeant Bamford indicates that the general joined the Air Corps Reserve after separation from active duty, but he also served as a member of the New York National Guard for the majority of the period between his active duty tours.

Capt. Louis Vocino
New Jersey ANG

• *Captain Vocino is quite correct. General Castle served with the 102nd Observation Squadron, NYNG, from November 22, 1934, until July 11, 1939. Unfortunately, space does not permit a complete biography of the Medal of Honor recipients. Consequently, we have tried to utilize the material dealing most directly with the exploit for which these men were awarded this nation's highest honor.*

★ ★ ★

Military Courtesy

Sir: Within the past year, I have had contact with a considerable number of airmen fresh from either tech school or basic training. My personal observation leads me to believe they are not receiving enough training in the areas of military customs and courtesies, wearing of the uniform and structure and mission of the Air Force. I would like to suggest an article in THE AIRMAN covering these subjects. With your wide readership, I feel certain it would do much to alleviate a situation I believe is getting out of hand.

A1C Neil Rudd
APO 235, San Francisco, Calif.

• *We have considered such an article for some time. However, knowing that a new regulation was in the process of being written, we have delayed publication until such time as it became available. Although it is impossible to give you a definite date, it will appear in the near future.*

★ ★ ★

Reunion

Sir: The 388th Bombardment Group (H) Association will hold its 12th annual reunion in Uniontown, Pa., between July 21 and July 23, this year. Anyone who served with the outfit at any time during WW II is invited to attend. Complete details may be obtained from me.

Edward J. Huntzinger
863 Maple St., Perrysburg, Ohio

★ ★ ★

Cadets

Sir: Your article pertaining to the Northrop T-38A *Talon* on page 35 of the February 1961 issue is in error. You state that the T-38 will provide "aviation cadets" with a speedy aircraft. However, since the beginning of the summer of 1960, aviation cadets have not been eligible for pilot training. All pilot trainees are now in the category of student officers.

Lt. Joseph E. Jurjevich
Charleston AFB, S. C.

Sir: Your articles on the OCS and OTS training program were interesting and enlightening. The aviation cadet program, both pilot and navigator, long since the major source of rated officers in USAF, is also in existence. Though soon to be deleted, the Aviation Cadet Training Program has had a most colorful and interesting record. May we also be worthy of mention in THE AIRMAN?

A/C Thomas J. Dubek
Vance AFB, Okla.

• *For the true facts of this involved question, see* Not Cadets *in* Letters to the Editor, *March 1961 issue.*

Unusual Currency

Sir: I have a dollar bill similar to the one described in *Airman's World* in your February issue. Could you give me the name of the company which purchased this bill from Sergeant Wilson?

MSgt. Joseph Roman (USAF, Ret.)
Tampa, Fla.

Sir: I also possess a dollar which is misprinted.

CWO Jack Drew
Pineville, La.

Sir: Please send me the name of the company which purchased Sergeant Wilson's misprinted dollar.

John F. Britton, Jr.
Lockbourne AFB, Ohio

Sir: I happen to own what I believe to be a dollar bill that may be of some value. Who bought Sergeant Wilson's?

Ford U. Ross AT1, USN
McGuire AFB, N. J.

Sir: I have an Indian head penny that has been minted twice and believe it to be of some value. Could you send me the name of the company mentioned in the article so that I may get an estimate?

MSgt. Walter E. Sheehan
Ellsworth AFB, S. Dak.

• *For numismatists everywhere, we do not have the address of the Gentile Corporation of New York, Sergeant Wilson's angel. However, any reputable coin dealer should be able to give you an estimate on the value of coins and currency which may be out of the ordinary.*

Sir: I have been collecting money for some time and the $100,000 you mention with regard to Sergeant Wilson's sale seems abnormally high. Are you certain this figure is correct?

SSgt. Dennie Provencher
Presque Isle AFB, Maine

• *We stand on the $100,000 as reported.*

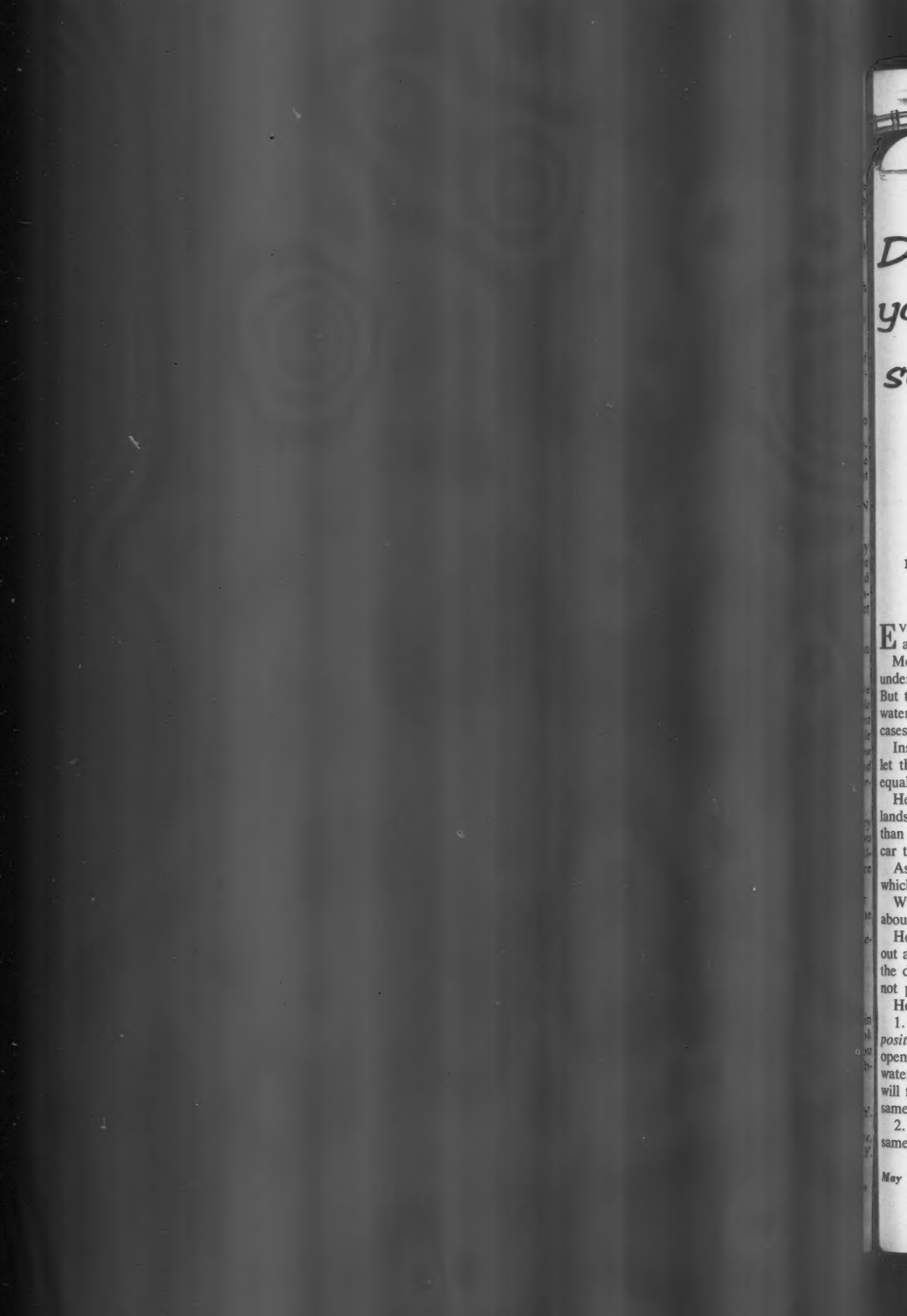
★ ★ ★

Publisher's Address

Sir: I have been unable to obtain a copy of the *Air Force Blue Book* through regular channels. Could you please send me the address of the publishing company?

TSgt. R. B. Pierce
APO 34, New York, N. Y.

• *The Military Publishing Institute, Inc., 55 W. 42nd St., New York, N. Y.*



DON'T PANIC- you can get out of submerged car

by Ken Werstler

Reprinted by permission, *International Rescuer**

EVERY YEAR in the U. S. an estimated 400 persons are trapped in autos plunging into water.

Most of the fatalities result because the rider, trapped under water, usually tries frantically to open the door. But the door will not open because of the pressure of water outside. He then panics—needlessly in most cases.

Instead, the rider must do an unnatural thing: Calmly let the car fill with water. When the pressure inside equals the pressure outside, the door will open easily.

He need not drown while the car fills. If the car lands upright, a pocket of air remains inside, more than enough to last the 10 or 15 minutes it takes the car to fill.

As it fills, he simply keeps his head in the air pocket, which is usually in the top portion of the car.

When the water stops rising, the pressure inside is about equal to the outside pressure.

He then takes a deep breath, opens the door, pushes out and up to the surface. The air pocket remains after the door is open, no need to hurry, take time and do not panic.

Here's what to do:

1. *If a car submerges with windows open, upright position.* Same air pocket only water rushing through open windows, brace yourself against force of incoming water, keeping head against roof out of water. The car will fill faster, not so long to wait, then open door the same way as described previously and rise to surface.

2. *When a car overturns and rests on its top.* The same procedure is required, head against floor board until pressure equalizes; then open door, and driver gets out.

3. *Car lands on side, window open—water rushing in.* Keep head against door below opening until car fills. Door would almost float open or smaller person could float out the window opening to rise to surface.

4. *Car lands on side, window closed.* Position self with head against door below window opening, until car almost fills. Then with few inches of space left, take deep breath, open window and open door or as above float self through window opening and to surface.

A fully expanded adult chest holds five quarts of oxygen or equal to one quart of pure oxygen; also five to six quarts of blood full of oxygen which gives another quart of pure oxygen.

One-half pint of oxygen will maintain life for one minute. Therefore, plenty of time to get out, if driver uses common sense and does not panic.

Almost 100 percent of the drivers or riders could get out alive, if they used their heads and did not panic. The unconscious and those unable to help themselves are the unfortunate.

A conscious person could even get an unconscious person out, by keeping his head above water. This is relatively easy as body is buoyant enough, no great weight is involved. By taking hold of hand or clothing at neck with one hand, rescuer could float out person same as underwater rescue for drowning victim.

*This article is printed in leaflet form by the International Association of Fire Chiefs.

INTERSERVICE RIVALRY AT CAPE CANAVERAL

No question about it, there is intense interservice rivalry at the Air Force Missile Test Center at Cape Canaveral, Fla. And high-ranking officers of all services are delighted with the situation. For here there is no petty squabbling, no captious cross-criticism, but a vigorous, healthful, and competitive pursuit of excellence. This inspiration to surpass—the general aspiration toward perfection—has created a climate on the Cape that favors an imaginative and energetic approach to the challenging problems of the space/missile age.

Here is an example of what is happening.

In the near future an American astronaut will be lofted into space for the first time on a modified *Redstone* booster. When this momentous "first" occurs, the project will be supported by an interservice military team which has been undergoing rigorous preparatory training for months. One element of the military support structure is Task Force 140, unquestionably the most unusual rescue/recovery team ever assembled. Its mission is to recover the manned spacecraft after flight or, in case of malfunction, to retrieve it at any landing point along its flight path.

The tri-service DOD team organized to support the first U. S. flight into space is headed by Maj. Gen. Leighton I. Davis, Commander of the Air Force Missile Test Center which includes Cape Canaveral in its complex of installations. Task Force 140, an important component of the joint support effort, is commanded by Rear Adm. F. V. H. Hilles, U. S. Navy.

The unique astronaut recovery force is divided into two sections or groups. Task Group 140.2 will be for recovery out at sea—beyond the 12-mile limit—and this function is charged to that branch of service usually associated with salt water and anchors aweigh.

It is in Task Group 140.1—designed to protect the astronaut against any possible mishap in the area surrounding the launch site—that the services have welded a closely knit unit dedicated to attaining the closest thing to perfect performance possible.

Lt. Col. Harry E. Cannon, Chief of the AFMTC Missile Operations Division, heads the 50-man team using Marine, Army, and Air Force equipment. There are three helicopters from Marine Air Group 26, New River, N. C., and three LARC vehicles from the Army Transportation Research Command at Ft. Eustis, Va. LARC stands for light amphibious re-supply cargo, and these vehicles are specially designed for use in sand, swamp, water, or other rough terrain. The Air Force Missile Test Center contributes to the team T-boats, turbocraft (jet-propelled 40-m.p.h. speed boats), as well as firefighting equipment and specialists in a variety of fields.

About one hour before the astronaut takes off on his historic flight, Colonel Cannon will deploy the elements of his team around the area of the Cape. One helicopter hovering over the Banana River to the west of the launch site will serve as observation point and command post. From this position, Colonel Cannon will have a panoramic view of the Cape and surrounding waters. He will be ready to direct the recovery units by radio if they are needed.

The other two helicopters will stand by at prearranged points on the Cape itself, ready for instant takeoff. One craft will carry medical personnel, a spacecraft engineer, and spacecraft technicians. The other will be manned by a "trouble-shooter team" composed of firefighters, trailblazers, SCUBA divers with full gear, and elaborate rescue and emergency equipment.

On the ground the three Army LARCs will be deployed in what is called the "high-probability cor-

Colonel Cannon will direct his 50-man team from command post in the Marine helicopter hovering over the area behind launch site.

Maj. Gen. Leighton I. Davis, USAF, heads the tri-service team organized to support the U.S. first flight into space. Here he checks on a point with Lt. Col. Harry E. Cannon, commander of Task Group 140.1.

ridor." Each LARC, followed by an AFMTC firetruck, will carry medical technicians and spacecraft specialists. The LARCs, a new development in Army ground transportation, have been fitted with special high-pressure fire pumps and hoists capable of lifting the space capsule.

Rounding out Colonel Cannon's interservice team are the AFMTC T-boats and turbocraft. The T-boats will be positioned in the sea off-shore from the Cape, ready to speed to the capsule impact point should it land in the ocean within the 12-mile limit. The jet-powered turbocraft will be located in the Banana River behind the launch area to aid in helicopter pick-up of the capsule should it land in the river.

The crews and technicians assigned to these various vehicles have worked diligently together on simulated capsule recovery missions, and in these training exercises the determination to excel has worked wonders for performance. Dummy spacecraft have been picked up in less than ten minutes after the alarm was sounded, and everyone is resolved to shave more minutes off the record time.

A full-dress test of Task Group 140.1 took place in July 1960 when the second Atlas-Mercury vehicle was launched. A malfunction occurred 65 seconds after lift-off—marring the test—but the helicopters and T-boats, vectored by radar, were at the scene of impact in less than 15 minutes.

Task Group 140.1 approaches peak readiness with full awareness of the weight of responsibility that may rest on their efforts. "Our recovery unit probably won't ever be needed," says Colonel Cannon, "because every possible precaution has been taken to insure a safe flight for the astronaut. Still, we will be ready—the astronaut's safety comes first."

These Army vehicles are almost as much at home in sea as on land. Designed for rough terrain they move easily over soft dunes.

Speedy USAF boats standing out from coast are ready to roar at full speed to the scene of emergency involving first astronaut.

About an hour before launch time, elements of the team will be deployed at positions, fully loaded with fuel and emergency gear.

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Why Don't You Subscribe, Too?

20-year-old Jug

TWENTY YEARS AGO THIS MONTH the famed P-47 *Thunderbolt* made her maiden flight.

This is the age of the supersonic jet fighter and the ballistic missile, but there are still a lot of airmen around who remember the P-47 as one of the great airplanes that ruled the skies in the halcyon days of World War II.

The legendary "Jug," as she was affectionately known to the men who flew her, was first conceived by Alexander Kartvelli. He worked out the initial configuration on the back of an envelope. The P-47 was first test flown on May 2, 1941.

As one former *Thunderbolt* pilot remembers her: "She was big, and on the ground she wasn't pretty. But beneath the blunt cowling was a great engine capable of 2,000 horsepower, and from tip to tip the huge four-bladed propeller measured 16 feet. Every inch of her structure was power, a rugged and sturdy machine with all the mass of a tank. And in each wing rested four .50-caliber guns, giving the *Thunderbolt* a fantastic punch—the ability to throw heavy lead at the rate of 7,200 rounds per minute."

The Republic P-47C *Thunderbolt* weighed seven tons. British pilots told our aces that the Jug wouldn't stand a chance against the maneuverable Me 109 and the Focke-Wulf 190.

But in the hands of aces like Schilling, Grabeski, and Johnson, the *Thunderbolt* proved itself one of the most deadly fighter planes of the war. Flying the Jug, the famed 56th Fighter Group shot down more German planes than any fighter group in the ETO.

During the years of fighting they lost 128 *Thunderbolts* in combat, but they destroyed 1,006 German aircraft—a ratio of eight to one against the toughest opposition American pilots had ever met.

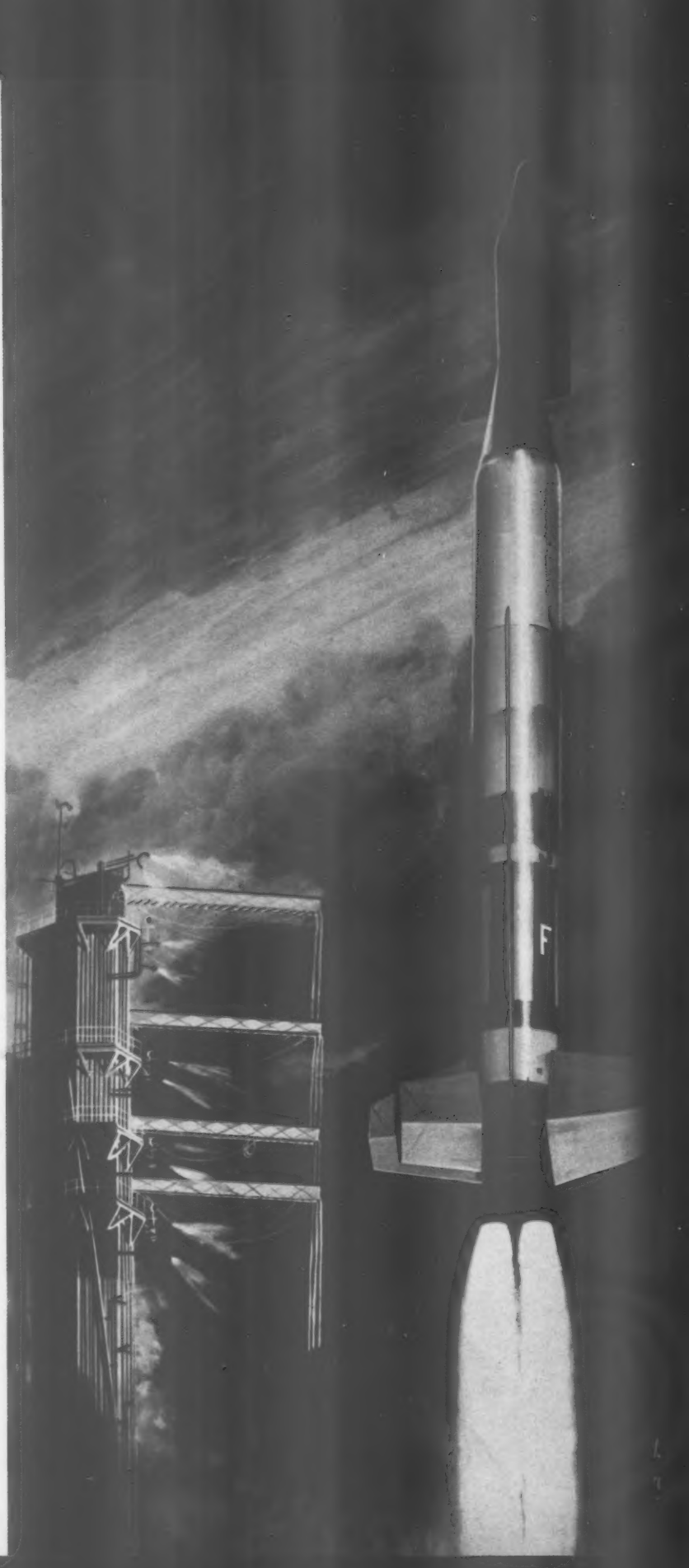
By the end of the war the P-47 had flown 546,000 combat sorties, destroying or damaging 11,874 planes, 9,000 locomotives, and 60,000 other Axis units of rail and motorized equipment. It was also the best close support aircraft developed and inflicted countless casualties during the war.

Though it would appear bulky and cumbersome next to one of today's sleek supersonic jet fighters, the P-47 once stood as America's fastest airplane. It was the

first to exceed 400 m.p.h. and later 500 m.p.h. Nothing but the jet age itself ever caught up with her.

This month, on the twentieth anniversary of the Jug, Republic Aviation Corp., builder of the plane, has invited all the men who flew her in combat to join in the P-47's birthday celebration. The meeting is sure to start many memories racing back to the hectic days of the early '40s. At least one *Thunderbolt* will be put in flying condition for the festivities, and many of the old P-47 pilots have volunteered to fly the resurrected Jug for the ceremonies. —DAVE KARTEN

JOINING OF THE MANNED AND UNMANNED



In this artist's conception, *Titan II* blasts off to lift the manned *Dyna-Soar* boost-glide vehicle into space. Last June the Martin Company proceeded under Air Force contract to develop *Titan II*, an advanced version of the ICBM now undergoing tests at Cape Canaveral, Fla. *Titan II* will deliver heavier firepower over intercontinental ranges with a greatly reduced reaction time. It may be launched directly from its underground silo only a few seconds after the order to fire is given and will be directed to its target by a self-contained, all-inertial guidance system.